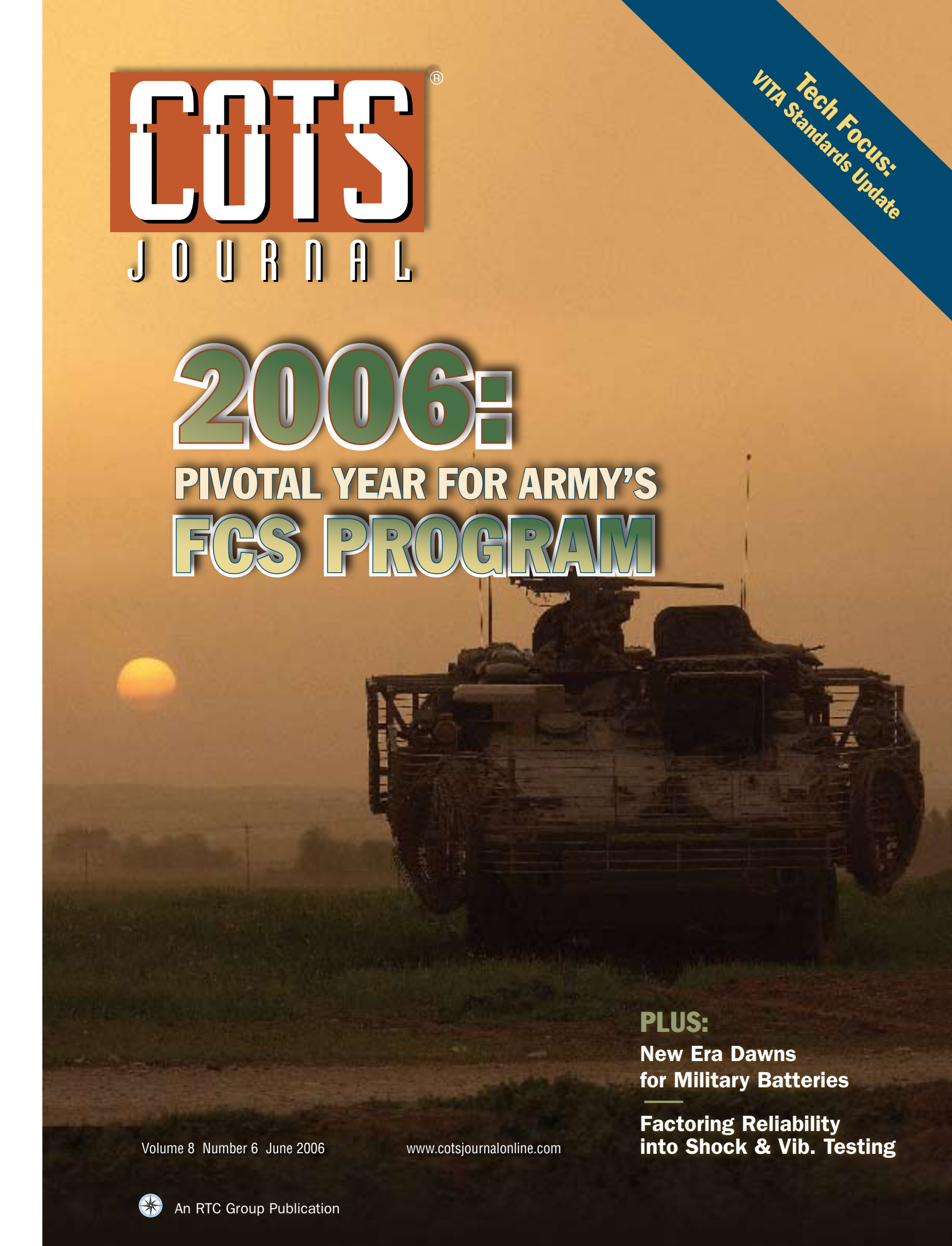
COTS® JOURNAL

Tech Focus: VITA Standards Update

2006: PIVOTAL YEAR FOR ARMY'S FCS PROGRAM



PLUS:

New Era Dawns for Military Batteries

Factoring Reliability into Shock & Vib. Testing

Volume 8 Number 6 June 2006 www.cotsjournalonline.com

An RTC Group Publication

Need reliability?
–40° to +85°

EPIC™ XE–900
1.0 GHz CPU

Features	XE–900	XE–800	XE–700
CPU	Via Eden	AMD Geode GXI	STPC
Clock speed	400 MHz; 733 MHz; 1.0 GHz	300 MHz	133 MHz
BIOS	General Software	Phoenix	Phoneix
DRAM support	to 256 MB	to 256 MB	32/64 MB
Compact/Flash	Type I or II	Type I or II	Type I or II
COM 1	RS–232	RS–232/422/485	RS–232
COM 2	RS–232	RS–232/422/485	RS–232/422/485
COM 3	RS–232	NA	RS–422/485
COM 4	RS–232	NA	RS–232
COM 5	RS–232/422/485	NA	NA
COM 6	RS–422/485/TTL	NA	NA
LPT1	0	0	1
EIDE	2	2	1
USB	2	6	2
CRT	1600 x 1200	1280 x 1024	1280 x 1024
Flat panel	LVDS	yes	yes
Digital I/O	24–bit prog.	48–bit prog.	24–bit prog.
Ethernet	10/100 Base–T	Dual 10/100 Base–T	10/100 Base–T
Expansion	PC/104 & *Plus*	PC/104 & *Plus*	PC/104
Power	3.6A operating	1.6A max.	1.6A max
Temp. range	–40° to 70/85° C	–40° to 80° C	–40° to 80/85° C
Shock/vibration	40/5g	40/5g	40/5g

Need Linux, QNX, Windows®?
Try our OS EMBEDDER™ KITS

Our kits are the shortest path to a successful OS on an Octagon embedded computer.

- Pick your Octagon SBC
- Pick the OS you prefer: Linux, Windows, QNX

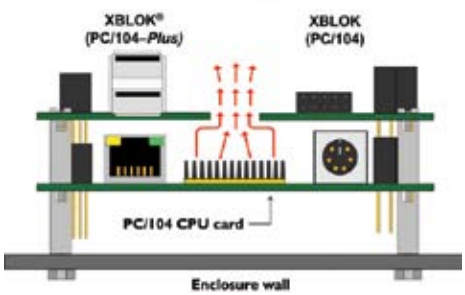
Octagon delivers a high performance, total solution.

Typical Linux kit includes:

- *Target CPU card*
- *Preloaded OS image on 256 MB industrial CompactFlash*
- *256 MB SO–DIMM module*
- *Interface cables*
- *Hard copy of manual*
- *Mouse*
- *CPU OS bootable CD*
- *Optimized OS version*
- *Full driver support for on–board hardware*
- *X–Windows support*
- *Example applications and source code*
- *Extra documentation*

Need PC/104 expansion?
Try our XBLOKs®

XBLOKs offer the best compromise in cost and function for both PC/104 and PC/104-*Plus*. Only 44% the size of a standard PC/104 card, you can add two functions to your system but increase the stack height by only one level. –40° to 85° C. Heat diagram shows enhanced cooling.



X–SRAM–2 MB
- 2 MB high speed, SRAM
- Read and write at full bus speed
- Pointers to memory saved if CPU resets or loses power

X–DIO–48 bit programmable digital I/O
- 48 digital I/O, 5V compatible
- Source and sink 16 mA per output
- Direct connection to opto-module racks

X–COM–2 dual UART
- Up to 230.4 kBaud data rate
- Supports RS–232/422/485
- RS–485 fault protected to ±60V

X–LAN–1 Ethernet LAN
- 10/100 Base–T, Intel 82551ER
- Fully plug–n–play
- High performance, PCI bus interface

X–USB–4 quad USB 2.0
- Speeds up to 480 mbps
- Mix and match USB 1.1 and 2.0
- Current–limited ports can supply 500 mA to external devices

Need a fanless system?
NEW CONDUCTION COOLING SYSTEM

Designed for the **XE-900**, our conduction cooling system eliminates a fan even at 1.0 GHz.

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XMB

XMB—mobile server with I/O expansion

The XMB-1 is part of Octagon's line of I-CORE™ systems that offer out-of-the-box solutions for transportation, military and security applications. The XMB-1 offers a "no compromise" design for a mobile server that optimizes the electrical, thermal and mechanical components for maximum reliability. The result is a powerful, yet fanless system in a rugged extrusion. The basic unit includes the processing power, power supply, memory and I/O for most applications. Yet, it can be easily expanded using PC/104 I/O function blocks or Octagon's XBLOK™ half-size PC/104 expansion modules.

Applications include planes, trains, buses, military, homeland security, police, communications, and SCADA markets. The PC architecture uses Linux, Windows® and other popular operating systems. Octagon has OS Embedder™ kits for easy installation of these operating systems as well as drivers for all the hardware.

XE-900

XE-900-Fastest EPIC™ board is now available with Windows® XP

The XE-900 SBC is a high-performance, low-power, x86 workhorse for embedded applications. It is an EPIC form factor SBC with a rich family of I/O functions. The XE-900 integrates video, serial ports, Ethernet, digital I/O, and USB networking into a single card. Support for three hard drives gives this card the versatility to adapt to any application. The XE-900 is ideal for applications in transportation, security, military, communications, distributed control, point-of-sale, ticketing machines, weighing equipment, and other similar environments.

The low-power requirements and built-in power management functions make it suitable for situations where battery life or heat dissipation is a concern. The CPU provides enough computing power for virtually any embedded application. The XE-900 SBC is fully compatible with Windows® XP, Linux and QNX.

Our products are designed and manufactured with exacting specifications under the supervision of a quality management system that is ISO 9001-2000 certified. The XE-900 will withstand high shock and vibration, and operates in temperature ranges from -40° to +85° C (400 & 733 MHz versions). This rugged single board computer will provide years of reliable service in the most challenging environments.





COTS JOURNAL

Features

June 2006 Volume 8 Number 6

Main Feature

Military Batteries

Tech Recon

FCS Tech Update

System Development & Test

Shock and Vibration for Boards & Enclosures

Technology Focus

VITA Standards Update

COTS (kots), *n.* **1.** Commercial off-the-shelf. Terminology popularized in 1994 within U.S. DoD by SECDEF Wm. Perry's "Perry Memo" that changed military industry purchasing and design guidelines, making Mil-Specs acceptable only by waiver. COTS is generally defined for technology, goods and services as: a) using commercial business practices and specifications, b) not developed under government funding, c) offered for sale to the general market, d) still must meet the program ORD. **2.** Commercial business practices include the accepted practice of customer-paid minor modification to standard COTS products to meet the customer's unique requirements.

——**Ant.** When applied to the procurement of electronics for the U.S. Military, COTS is a procurement philosophy and does not imply commercial, office environment or any other durability grade. *E.g., rad-hard components designed and offered for sale to the general market are COTS if they were developed by the company and not under government funding.*

Departments

Coming in July...
...See Page 75

Cover Story ..... Page 43

The Stryker vehicle family will be among the Current Force vehicles to benefit from the transfer of Future Combat Systems communications technology. Raytheon has a contract to transfer that technology to the Stryker Brigade Combat Team. Shown here are soldiers in a Stryker vehicle from 2nd Platoon, Company B, 1st Battalion, 5th Infantry Regiment, 25th Infantry Division, on patrol in Iraq in April of last year.

(Photo courtesy of U.S. Army).

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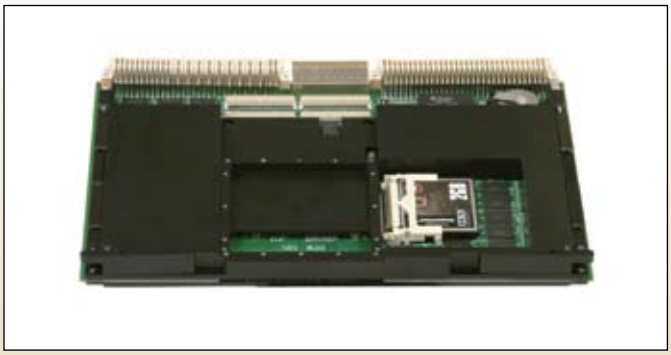
RPM



RPM VMEbus Conduction-cooled Pentium-M Single Board Computer

The RPM is a rugged conduction-cooled VMEbus (and VME64) compatible platform based on the Intel® low-power Pentium® M (Dothan) processor. The RPM takes advantage of the Pentium M's low-power consumption as a rugged Single Board Computer (SBC) and it is an IEEE 1101.2-compliant, conduction-cooled VMEbus module with wedge locks and a full-board heat sink for high shock/vibration environments and temperature extremes.

The RPM is the same board design as the convection-cooled DPM . The DPM typically uses front panel I/O routing but can be provided with identical I/O routing as the RPM for application development in a standard VMEbus chassis.

The 855GME Graphics Memory Controller Hub (GMCH) and 6300ESB I/O Controller Hub (ICH) chipset supports PCI-X expansion, integrated VGA/DVO interface, USB 2.0, ATA/100, and Serial ATA (SATA). Two USB 2.0 ports, a COM port and IDE are all accessible from the rear P2 connector. SVGA and Digital Vido Output (DVO), dual 10/100/1000BaseT (VITA 31.1 compatible), dual SATA, and LPC bus are routed to the optional P0 connector. On-board CompactFlash permits single-slot booting. One PMC-X site is provided for additional I/O expansion.

The RPM can meet an operating temperature range of -40°/+85°C.

BSPs can be provided for several operating systems.

CRM1

CRM1 Conduction-cooled CompactPCI/PICMG 2.16 Pentium-M Single Board Computer

The CRM1 is a rugged conduction-cooled 6U single-slot Compact PCI (PCMG 2.16 compatible) platform based on the Intel® low-power Pentium® M processor. The CRM1 takes advantage of the Pentium M's low-power consumption as a rugged Single Board Computer (SBC) with wedge locks and a full-board heat sink for high shock/vibration environments and temperature extremes.

The CRM1 is the same board design as the convection-cooled CPM1. The CPM1 typically uses front panel I/O routing but can be provided with identical I/O routing as the CRM1 for application development in a standard CompactPCI chassis.

The 855GME Graphics Memory Controller Hub (GMCH) and 6300ESB I/O Controller Hub (ICH) chipset supports PCI-X expansion, integrated VGA/DVO interface. I/O interfaces available from rear I/O board include two 1000BaseTX ports are routed to the backplane in compliance with PICMG 2.16. Other rear I/O includes IDE, COM1/2, floppy, dual SATA, four USB 2.0 ports and DVI-I integrated digital/analog graphics.

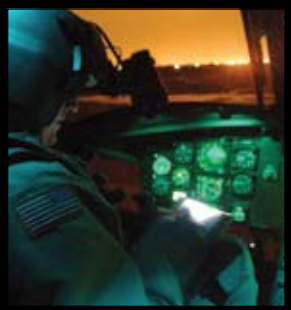
The CRM1 meets an operating temperature range of -40°/85° C with it's standard 1.4 GHz Pentium M processor.

On-board CompactFlash permits single-slot booting. Two on-board PMC sites allow additional I/O capabilities in a single 6U slot.

The CRM1 was design for compliance with MIL-Std-810F. Options include conformal coating.







Whatever Your Backplane

or lack thereof...

DPM

- VME64, VITA 31.1
- Pentium M to 1.8 GHz
- 855 GME chipset with embedded graphics
- Low power consumption
- -40°/+71°C operation

CPM1

- CompactPCI, PICMG 2.16
- Pentium M to 1.8 GHz
- 855 GME chipset with embedded graphics
- Two PMC sites

KPM-S1

- Custom embedded
- Pentium M 2 GHz
- 7520 chipset with up to 8 GB DDR 400
- ATI M26 Mobility Radeon graphics on PCI Express

Whatever Your Environment

Conduction cooled versions of the VME and CompactPCI/PICMG 2.16 single board computers

- Extended temperature to -40°/+85°C
- Tested to MIL STD 810 and 901D
- Tested to high shock/vibration
- Conformal coating available
- Customized interfaces supprted

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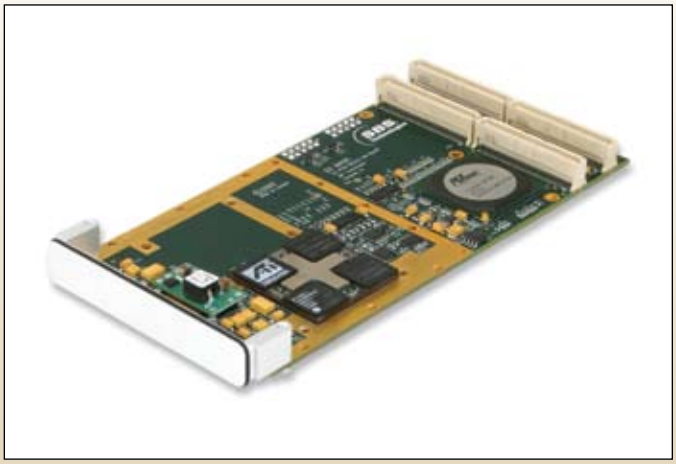
ROC—Rugged Operational Computer

The ROC from SBS, Lightweight, Deployable, Rugged Vehicle Computer.

Weighing less than six pounds and measuring less than 100 cubic inches, the versatile Rugged Operational Computer (ROC) from SBS Technologies defines a new standard for deployable, compact vehicle computers. The lightweight ruggedized ROC vehicle computer is a powerful computing system based on PCI Mezzanine Cards (PMCs). The compact and powerful ROC fits well into the tight spaces usually found in military vehicle applications, aircraft, and even space vehicles. The ROC can be configured with an Intel® or PowerPC® processor PMC and is the first in a new line of general purpose vehicle computers, giving a true off-the-shelf solution to the challenge of providing low-cost, high density computing and I/O capabilities within an integrated avionics, navtronics and vetronics application.

G2 Graphics PMC Module



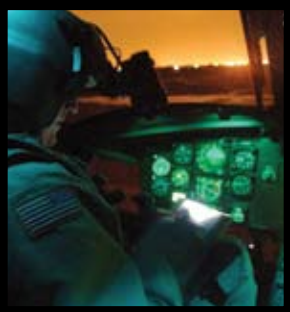
The SBS G2 Graphics PMC for video capture, processing, display.

The G2 Graphics PMC Module provides powerful 3D graphics processing with ATI's popular Mobility Radeon 9000 chip, as used in today's highest end notebook computers, on a PMC module. The G2 is available in three versions: G2-Basic—single head graphics applications; G2-Dual - dual display applications; G2-Plus—dual display and up to two channels of video capture. It Provides:

- Single display, dual display and video capture configurations
- Three levels of ruggedness—commerical, extended and conduction cooled
- Powerful graphics processing from ATI Radeon® 9000
- Supports a full range of monitor types and resolutions







Selecting the right Pentium® M-based computer has never been easier.

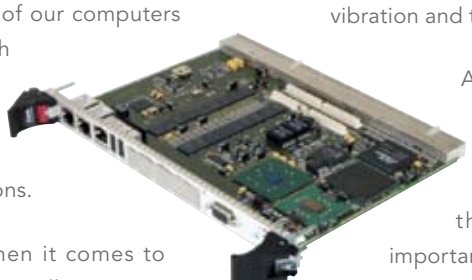
SBS knows Intel® Pentium® M processors. We have the CompactPCI®, VME, PMC or AdvancedMC™ single board computer you need.

Intel® Communications Alliance
Associate Member
SILVER

RoHS compliant 2002/95/EC

CE9 available with ROHS Compliance

SBS HAS NINE INTEL® PENTIUM® M processor-based single board computers for you to choose from. So it's likely that we have exactly the board you need. And we offer many of our computers in several configurations, with various I/O types and chipsets designed for specific applications, from industrial to defense to telecommunications.



We also offer you options when it comes to processor speeds and types, as well as memory configurations. Depending on the individual product, SBS can often give you the choice of a standard-duty product, an industrial-duty product with extended temperature ranges, or a rugged-duty option designed to survive extreme shock, vibration and temperature variations.

After nearly two decades of designing embedded computing products, SBS can also offer you something that is perhaps even more important than product selection, and that is the benefit of our experience. So when it's time to select an Intel® Pentium® M processor-based single board computer, select SBS.

SBS Technologies

SBS knows. Find the compact Intel® Pentium® M processor board you're looking for at **www.sbs.com/pentiumm** or call **800.SBS.EMBEDDED**

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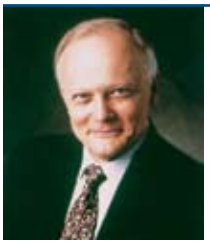
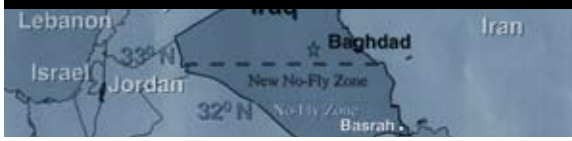
Publisher's Notebook





Disjointed Thoughts on MEECC

I hope you don't keep old issues of *COTS Journal*. I just did something I don't do very often and that is go see what I babbled about last year after MEECC (Military Embedded Electronics and Computing Conference). I noticed that last year I used Moses as part of an analogy like I did in the May '06 issue. And I whined about people at MEECC who still don't understand what COTS is and what COTS isn't. I'm tempted to say that those who misuse the term—particularly those who portend to be players or experts in the COTS military embedded computer market—are attempting to do revisionist history. But the truth is, I think they just don't know any better. Enough about that. My only comment is that if someone doesn't understand COTS, then how do they understand anything about the Mil embedded market? Call me if you need a copy of the Perry Memo, or look at the definition on our table of contents page.

Many of you are aware that I'm the Program Chairman for MEECC, and I organize the speakers and editorial coverage for the conference. This is a challenging endeavor, to say the least. MEECC has a unique format: It's not a sales show or a military organization-affiliated conference. That allows for complete independence of invited speakers and publications that cover the conference. Attendees and sponsors don't participate to get a sales pitch, or to get "cheerleader" presentations. They go there to get useful information to help solve problems. The good news is that I've heard from several organizations that they are considering the creation of conferences using similar formats targeting the Military market, or changing the current format of their existing conference. This can only be good for our industry. We've had too many shows and conferences that focus on the wants of the exhibitors and not enough on the needs of the attendees and the industry.

When The RTC Group started *COTS Journal* in 1998 we were the only publication that focused on the technology for the Mil embedded market. At the time, there were a lot of books that covered Mil programs and industry trends. Since then we've seen several new books come on the scene and some shift their focus to targeting the Mil embedded market. Most of those publications, including *COTS Journal*, covered the proceedings of MEECC. This year there was a marked—and welcome—shift in the conference's editorial coverage. It's about time that the Mil embedded market started to get the attention it deserves. MEECC had editors from *Aerospace Engineering, Aviation Week & Technology Review, Jane's Defense Weekly and SIGNAL Magazine*, along with the usual publications.

Last month I commented about VITA 58, which is a new standards effort to use "cans" in place of boards or modules. These "cans" are to be self-contained systems that just plug in—I'm not sure what they plug into but I guess that's what they're working on. I've read editorials about how this technology is going to be the wave of the future. And I listened to Dennis Carlson, Principle Speaker at MEECC, discuss how these concepts revolutionized auto racing, an air sensor and the THAADS ground control vehicle (I hope I got that right because his presentation couldn't be posted on the MEECC Web site). His work is extremely impressive and shows how we need to incorporate the needs of the operators and maintenance personnel in the formulation of all systems. Doing so increases the overall effectiveness of the system by several multiples. Dennis didn't address how we can incorporate this at the embedded building block level. Rather, his examples were at the major element level. We're going to have to stay tuned to the events taking place at the VITA 58 meetings to see how these "cans" are going to work at a level below the prime contractors.

The DMEA (Defense MicroElectronics Activity) has been actively working with the Mil embedded industry for several years, and doing a great a job. Kevin Rankin, Microelectronics Engineer with DMEA, gave a powerful presentation on RoHS and how it will affect every military program. DMEA is actively working with Program and Project Managers to develop criteria and standards for suppliers that may be considering using—even if they are unaware—lead-free parts in new or re-worked equipment. Dr. Neile Poole, from Henkel Corporation, made the hair stand up on the back of my neck from fear, as he showed slide after slide of solder joints from different mixed technologies. At the conclusion of both presentations these guys were swarmed by editors and attendees for more information.

I guess if I learned one thing from MEECC, it's that we have so much more that we need to know about the technology and our marketplace. The bottom line is we need to find ways to get together like that more often. ■■

Pete Yeatman, Publisher
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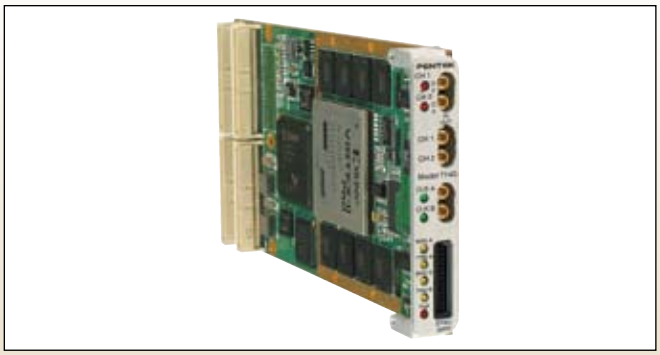
Model 7140



Software Radio Transceiver PMC/XMC Module

Features

- Dual digital upconverter/downconverter handles 40 MHz bandwidth RF or IF input signals
- Xilinx Virtex-II Pro FPGA with two PowerPC cores to create complete application
- XMC I/O for high-speed data streaming with switched backplane fabrics
- LVDS clock/sync bus for multiple module synchronization
- Pentek GateFlow® FPGA Resources: FPGA Design Kit and IP cores
- Pentek ReadyFlow® Board Support Libraries for quick board startup and operation
- Optional 256-channel narrowband installed core available
- Conduction-cooled version available

The Model 7140 combines both receive and transmit capabilities with a high-performance Virtex-II Pro FPGA and supports the emerging VITA 42 XMC standard for high-speed I/O. This module is also available in a variety of form factors including PCI, 3U and 6U cPCI, ruggedized and conduction-cooled PMC models.

The front end accepts analog RF or IF inputs and couples them into two 14-bit A/Ds running up to 105 MHz sampling. The digitized outputs pass to the FPGA for signal processing and routing to other resources that include a downconverter, an upconverter with dual D/As, 512 MB DDR SDRAM, delay memory, and the PCI bus.

This module is ideal for software radio SIGINT and JTRS applications.

For more information visit: www.pentek.com/go/cots7140

System RTS 2502

Development Platform Handles Wideband Recording and Playback

Features

- Dual-channel wideband A/D data recording to disk array
- Four D/A converters with dual upconverters for playback from disk
- Configurable signal processing with multiple Virtex-II FPGAs and 1 GHz G4 PowerPC
- High-speed interfaces: FPDP, RACE++, Gigabit Ethernet
- SystemFlow™ API and development libraries for out-of-the-box GUI system
- Optional GateFlow® FPGA Design Kit and IP cores
- Ideal for radar, wireless, SIGINT, telecom and satcom

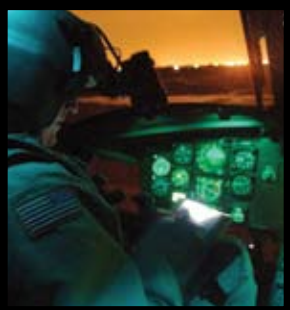
The Pentek RTS 2502 is a highly scalable real-time platform for acquiring, downconverting, processing, analyzing, recording, playing back and upconverting wideband signals. Integrating recently introduced A/D and D/A converters, digital downconverters and upconverters, FPGAs, and a PowerPC processor, it allows the system engineer to take advantage of the latest technology for signal processing.

The combination of data recording and playback capabilities in a single unit makes the RTS 2502 especially valuable for developers. Instead of using simulated signals and signal analysis tools during system development of radar or communication systems, engineers can take the RTS system into the field to capture and generate real-world, real-time signals for direct validation of signal-processing algorithms and system hardware.

For more information, visit: www.pentek.com/go/cots2502







ROCKET SCIENCE AT ROCKET SPEED.

At 2 GHz, it's not just fast. It's simply brilliant!

Blast off with the new Model 6826 A/D board. It's fully loaded with dual 2 GHz 10-bit A/D converters, powerful FPGA resources, plenty of memory and fast interfaces—all ready to tackle your toughest high-speed wideband signal processing tasks.

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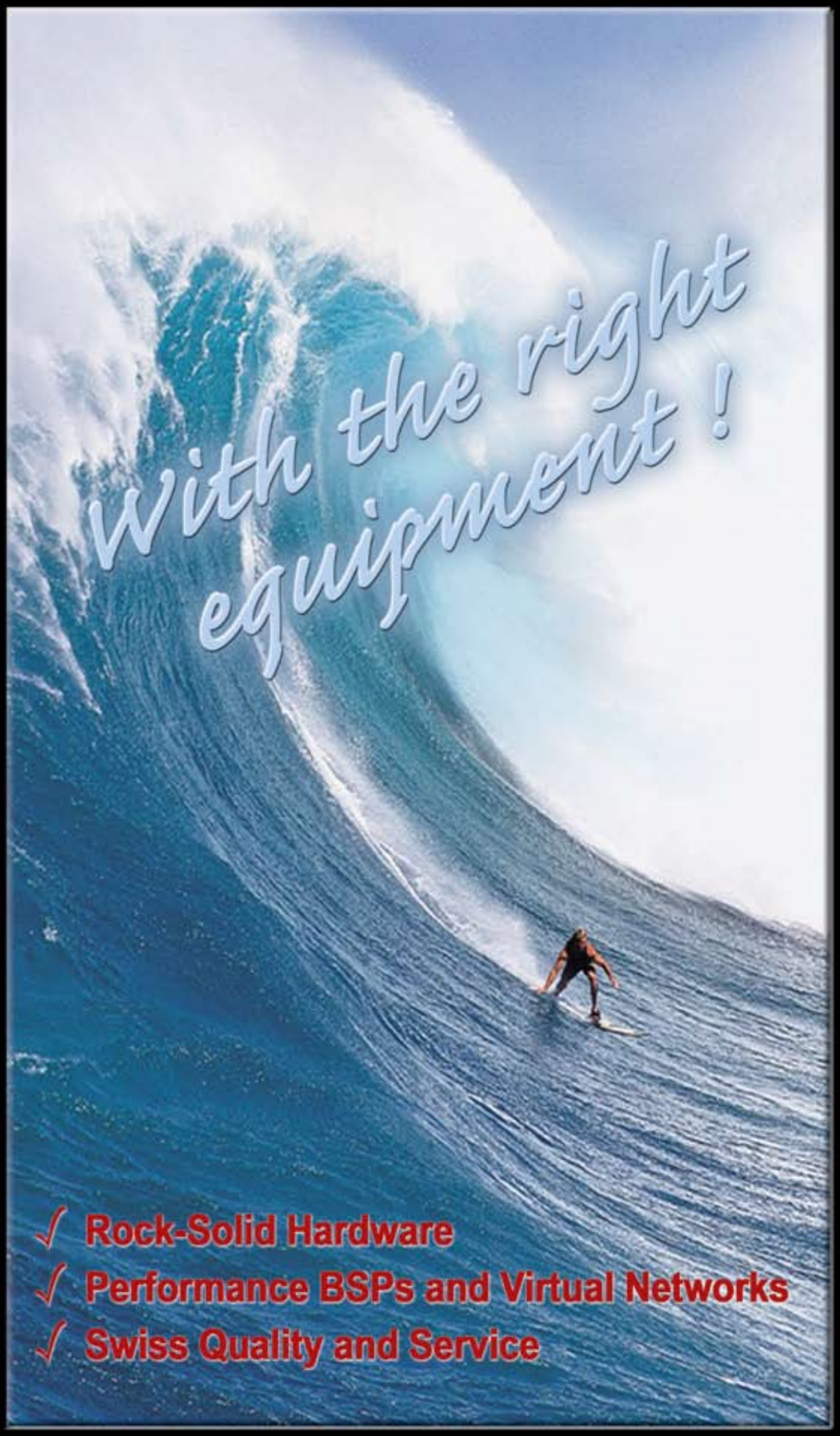

The Inside Track

General Dynamics Enlists Tekmicro I/O Boards for Submarine Duty

TEK Microsystems announced that it has received orders approaching $0.5 million from General Dynamics Electric Boat for its PowerRACE-2 I/O Controllers and TAXI protocol-based PMC modules. The boards will be used in the Total Ship Monitoring System (TSMS) of Virginia-class submarines to quickly detect and isolate noise generated by the submarine. The Virginia-class submarine (Figure 1) is an advanced stealth multi-mission submarine. The TSMS maximizes a submarine's acoustic stealth advantage by providing continuous noise monitoring and alerting the crew to any conditions that could degrade the mission or performance capabilities of the submarine.

The PowerRACE-2 family of I/O controllers is suited to streaming I/O applications such as the noise monitoring system of TSMS. Several hundred sensors are installed throughout the submarine to monitor the noise levels of all systems. The PowerRACE-2 is fully fabric-enabled with supporting software and drivers to allow the TAXI-based PMC module to deliver the required I/O processing speeds required by the TSMS program.

TEK Microsystems
Chelmsford, MA.
(978) 244-9200.
[www.tekmicro.com].

Figure 1

The Virginia-class submarine, like the USS Texas shown here, is an advanced stealth multi-mission submarine. Its TSMS system maximizes a submarine's acoustic stealth advantage by providing continuous noise monitoring and alerting the crew to any conditions that could degrade the mission or performance capabilities of the submarine.

Three Firms Team to Form New XTX Alliance

Embedded computer vendors Advantech, Congatec and Ampro Computers have announced a new alliance to help promote the XTX standard for computer on modules. The goal is to provide existing ETX users with a logical and cost-effective upgrade path that avoids large-scale carrier board redesign and provides access to the newest serial technologies such as PCI Express, SATA and LPC. The group is inviting all embedded industrial platform providers to join the new XTX alliance in order to help drive and develop the specification further.

XTX was developed by the above founding members to evolve the ETX standard and close the gap between ETX and COM Express. Customers looking for a logical and cost-effective upgrade path from ETX to high-performance I/Os can now choose the XTX form-factor rather than re-engineer their designs. XTX maintains the same mechanical dimensions and connectors so ETX solution developers can keep their existing carrier board and heat spreader designs, giving them a quick, simple, risk-free way to upgrade to state-of-the-art technologies such as PCIe, SATA, LPC, ExpressCard, high-definition audio and additional USB ports. The XTX specification is positioned as an upgrade path for legacy ETX solution developers.

Advantech
Irvine, CA.
(949) 789-7178.
[www.advantech.com].

Ampro Computers
San Jose, CA.
(408) 360-0200.
[www.ampro.com].

Congatec
Deggendorf Germany
+49 (991) 2700 – 100.
[www.congatec.com].

Agilent Technologies to Continue Support of Navy's CASS Program

Agilent Technologies announced that it will support the U.S. Navy's Consolidated Automated Support System (CASS) program beyond the 20-year production support contract to the year 2015. CASS is a high-performance, standardized test environment that is used onboard aircraft carriers and at other locations to test and maintain Navy aircraft electronics. Agilent's seven-year support commitment extension is expected to generate an estimated $45 million in services revenue between 2009 and 2015.

The U.S. Navy currently has an estimated installed base of 9,195 CASS-related assets that require support. That number is expected to steadily increase by 2015. During the extended

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Figure 2

CASS is a high-performance, standardized test environment that is used onboard aircraft carriers and at other locations to test and maintain Navy aircraft electronics. The new Reconfigurable-Transportable CASS (RT-CASS) is being produced to support USMC and US SOCOM V-22 Osprey (shown) as well as other aircraft.

support period, Agilent will leverage its hardware and service expertise in support of the CASS parts inventory, repair strategy and automated test equipment (ATE).

There are five CASS station configurations designed for specific testing requirements, including hybrid; radio frequency; communications, navigation and identification; electro-optical; and reconfigurable transportable CASS. Lockheed Martin serves as the CASS prime contractor and system integrator, while Agilent serves as a major supplier-partner. The newest member of the CASS family, Reconfigurable-Transportable CASS (RT-CASS), is being produced to support USMC and US SOCOM V-22 (Figure 2) as well as USMC EA-6B, F/A-18 and AV-8B aircraft.

Agilent Technologies
Palo Alto, CA.
(650) 752-5000.
[www.agilent.com].

BAE Systems Taps Saft for Future Combat System MGV Batteries

BAE Systems has awarded Saft a $2 million, multi-year contract to design and supply lithium-ion (Li-ion) battery modules for hybrid-electric Future Combat System (FCS) Manned Ground Vehicles (MGVs). Saft's very-high-power Li-ion power modules were selected to meet the MGV program's Battery Module, High Voltage (BMHV) requirement because of their superior performance and ability to meet objective requirements.

Saft will supply its VL-V Li-ion battery technology for the NLOS-C vehicle, featuring integrated battery monitoring and status electronics as well as a breakthrough thermal management system. The battery's ability to withstand extreme temperatures is critical to hybrid military vehicle automotive applications. BAE Systems and General Dynamics are teamed to develop and field a family of transportable, deployable, lethal and survivable MGVs. This next generation of combat vehicles will provide the majority of the firepower in the FCS-equipped Brigade Combat Teams and will be critical nodes in the FCS network. The two companies have integrated design teams working to develop and demonstrate the family of eight manned ground vehicles featuring a common platform design with common components and subsystems, with unique mission modules and all the variants linked together by networked battle command.

Saft America
Cockeysville, MD.
(410) 771-3200.
[www.saftbatteries.com].

ARINC Wins Contract for Towed Sonar Program

ARINC Engineering Services (AES) has been awarded a 5-year, $10 million contract to provide technical, engineering and logistics support for the U.S. Navy's AN/AQS-20A Towed Sonar program. The AN/AQS-20A Towed Sonar (Figure 3) is a newly developed, advanced system to detect, localize and classify many types of mines, including bottom, close-tethered and volume types. It is designed to be deployed by the MH-60S helicopter and the Navy's Remote Mine-hunting System (RMS). AES and a team of three subcontractors will support the AN/AQS-20A program.

The contract represents one of ARINC's largest contract wins as a prime under the Navy SeaPort program. In preparation for the deployment of the Navy's Littoral Combat Ship (LCS) in FY08, the Panama City AN/AQS-20A team has the responsibility of ensuring the towed body meets Developmental and Operational Test requirements and is supportable aboard the LCS or shore site maintenance facility. The Naval Surface Warfare Center Panama City has overall Technical Direction Agency responsibility for the AN/AQS-20A Towed Sonar program.

The AN/AQS-20A mission is to detect, classify and identify bottom, floating and moored mines in both deep and shallow water. It accomplishes this through acoustic sensors installed on the Navy's common towed body. The AN/AQS-20A can be used with either an MH-60S or MH-53E helicopter to support airborne mine countermeasure operations, or on the LCS and DDG in conjunction with the Remote Mine-hunting System in support of surface ship mine countermeasure operations.

ARINC
Annapolis, MD.
(410) 266-4000.
[www.arinc.com].

Figure 3

The AN/AQS-20A Towed Sonar is an advanced system designed to detect, localize and classify many types of mines, including bottom, close-tethered and volume types.

COTS Websites

http://leadfree.ipc.org

Technical Info Abounds on IPC's RoHS Site

Now that the July 1 deadline for RoHS compliance is on our doorstep, technical information on lead-free electronic system design is more important than ever. The Restriction of Hazardous Substances (RoHS) directive restricts makers of electronic equipment from selling to the European Union market, any equipment that exceeds a specified maximum concentration per homogeneous substance of materials considered hazardous including lead and four other substances. And although the military is exempt, it's a matter of concern to makers of board-level products because most companies craft board designs targeted for both military and non-military markets.

While the Web is jam-packed with sites talking about RoHS, IPC's Lead-Free portal presents some of the best technical resources on the subject. The compliance section of the site includes all the latest information including which products are covered, the definition of lead-free (.pdf) and testing. Also covered are links to RoHS resources including training, conferences and compliance tools. Meanwhile, the implementation section of the site draws upon IPC's strength as a technical, standards developing organization by offering information on solder selection, tin whiskers, laminate and other PCB material issues, and lead-free components. The site provides tools like a peer-to-peer lead-free listserve and links to relevant IPC standards. IPC is a U.S.-based trade association that brings together players in the electronic interconnect industry, including designers, board manufacturers, assembly companies, suppliers and original equipment manufacturers.

IPC, Bannockburn, IL. (847) 615-7100. [www.ipc.org].

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www.condoreng.com
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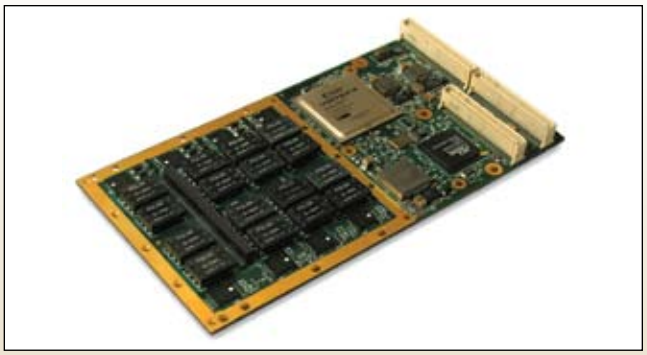
F: (805) 963-9630

EPMC-1553



8-channel PMC module for MIL-STD-1553

The **EPMC-1553** is the first PMC (PCI Mezzanine Card) module to offer up to 8 dual redundant MIL-STD-1553B Notice II channels. Available in commercial, ruggedized and conductively cooled versions with one, two, four or eight dual-redundant channels, the EPMC-1553 includes advanced API (Application Programming Interface) software that reduces application development time.

Standard features include: transformer coupling; 128 Kbytes of RAM per channel; 45-bit message time-tagging; triggers; 8 bi-directional avionics-level discretes; 8 bi-directional RS-485 differential discretes; support for 66 or 33MHz PCI bus operation; automatic/manual RT Status Bit and Mode Code responses; programmable or hardwired RT address lines (with 1760 startup time and busy bit set); along with advanced BC functionality.

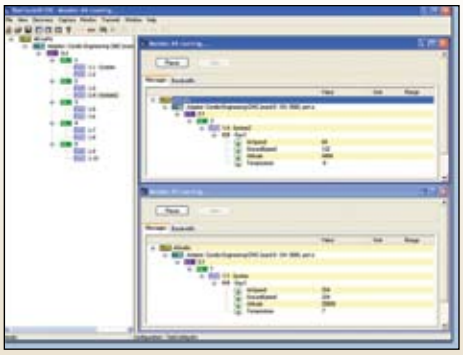
An IRIG-B signal Receiver/Generator with GPS synchronization and multiple configuration options are optionally available.

Multi-function Interfaces All EPMC-1553 interfaces provide simultaneous Bus Controller, Remote Terminal(s) and Bus Monitoring functionality.

Single or 31 Remote Terminal Support Configuration options for either single (-T) or 31 (-M) RTs are available.

Software The EPMC-1553 is provided with our advanced CORE-API software in easily portable source code, along with support for Windows XP, 2000, Me, NT, 98, 95, and VxWorks. Contact factory for Linux or Integrity O/S support.

BusTools/AFDX



AFDX Bus Analysis GUI

BusTools/AFDX is a Windows XP/2000-based GUI application solution that establishes new levels of power, flexibility and ease-of-use for AFDX (Avionics Full Duplex Switched Ethernet) traffic monitoring, analysis and simulation. Available for use with BusTools/AFDX offers an intuitive interface to view, log, analyze and generate AFDX network traffic at the Adapter, End System, Virtual Link (VL) and Port levels.

Auto Discovery Starting from the Network Discovery window, Condor's exclusive, high-level Auto-Discovery feature provides the user with an immediate overview of all network traffic.

Simultaneous Real-Time Monitoring and Logging BusTools/AFDX simultaneously supports real-time monitoring while logging fully loaded traffic to disk storage. Apply Message Structure definitions, and then monitor Data Elements in real-time with engineering unit displays.

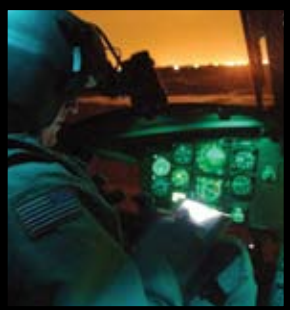
Filters and Triggers BusTools/AFDX provides advanced filtering and triggering functionality that is supported by a simple and intuitive user interface.

Data Centric Analyzer BusTools/AFDX utilizes a Message Structure/DataSet/DataType architecture for managing your ICD information by translating packet payload data into engineering unit information.

AFDX Traffic Generation BusTools/AFDX can accurately replay (or loop) previously captured log files. To quickly create new files, Filters can be easily applied while replaying a file and by logging again, a revised file is created for traffic generation.







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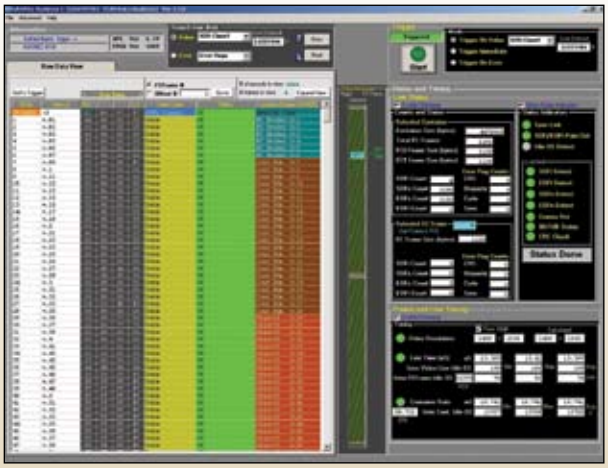
New: ARINC 818 and HOTLink™ Analyzers



GRAV64 ARINC 818 Analyzer

Great River Technology introduces two new protocol analyzers for ARINC 818 and HOTLink™ systems.

The ARINC 818 Analyzer is based on FC-AV and is becoming the standard for uncompressed, flyable video systems. This analyzer is available in standard: 1x, 2x and 3x Fibre Channel rates, with custom rates also available. Unlike FC analyzers, the ARINC818 Analyzer not only decodes the raw data, but also provides detailed analysis of the FC frame and container headers, video frame timing, line timing, video resolution, and link errors.

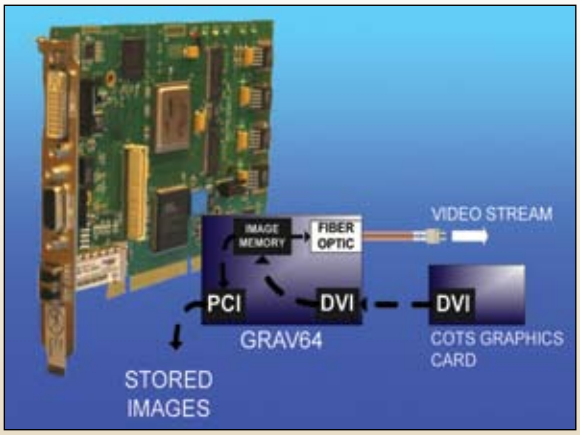
Multiple triggering options and data search features are effective in finding protocol errors and in verifying ARINC 818 compliance.

The HOTLink™ Serial Link Analyzer (HSLA) captures up to 4GB of data, and features advanced triggers and search options. HOTLink™ is used in a number of applications, such as infrared cameras and JTRS designs. The HSLA is available for frequencies between 160Mbps to 1.0Gbps.

Built on the successful GRAV64 line of products, the analyzers are 64-bit PCI cards that run under Windows.

Detailed descriptions are available online at:
www.greatrivertech.com/products

New: DVI to Fiber (and back!)



GRAV64 PCI FCAV DVI

The GRAV64 PCI DVI card converts XGA or SXGA DVI signals to fiber (or vice versa) using the FC-AV or ARINC 818 protocols. The card converts full motion DVI graphics to FCAV and is used as a low cost graphics generator for cockpit displays, HMDs, HUDs, simulators, and video processors. The card is also a frame grabber and an FC-AV test pattern generator.

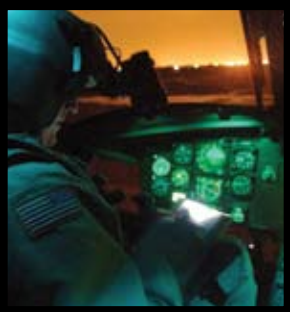
Fibre Channel provides a reliable, high bandwidth video link for point-to-point video connections (multi-mode - 500 meters / single mode - 10km), or high EMI environments. Each card is Fibre Channel compliant at the FC-0, FC-1, and FC-2 layers. The upper layer protocol is based on the FC-AV container system (ANSI INCITS 356-2002).

Available in 2x and 3x fiber channel speeds, the 64-bit card runs under Windows or Linux systems. Sofware Development Kits are available for incorporating the GRAV64 card into automatic test equipment and video recording systems. Custom versions of the card are available for different DVI resolutions, FCAV formats, and link speeds.

The GRAV64 PCI FCAV DVI card is part of Great River Technology's suite of FCAV and ARINC818 products: protocol analyzers, PCI and PMC frame grabbers and DVI converters, and custom embedded modules.







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FC-AV Development Tools

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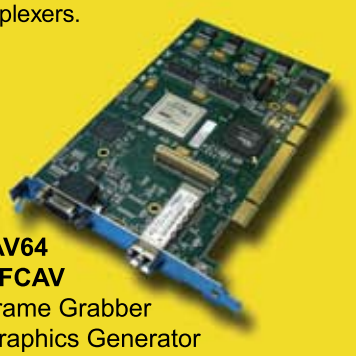
Great River Technology's tools have helped military and aerospace contractors develop high performance MFDs, tactical displays, mission processors, IR cameras, surveillance turrets, and video multiplexers.



GRAV64
PCI FCAV
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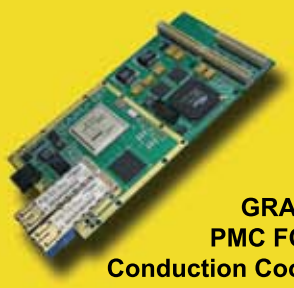
- Graphics Generator
- DVI converted to FC-AV



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Program Briefing

DD(X) Program Leads Navy's Voyage toward Cost-Efficient Computing

Blending a central server core with layered services architecture, DD(X) boasts a computing environment that's cost-efficient, upgradeable and powerful.

Jeff Child
Editor-in-Chief

Consideration for the "big picture" is a theme that runs deep among all of the Military's advanced programs. The push is on to leverage technologies, common computing standards and design concepts across multiple platforms. The Navy's DD(X) program exemplifies that trend. The Navy's new DD(X) program is the centerpiece in a family of three surface combatant ships, including a destroyer (Figure 1), a cruiser and a smaller craft for littoral operations. Over the life of the program, the DD(X) contract is expected to total $100 billion for construction of around 70 warships comprising the DD(X) family. The cruiser and destroyer are expected to share a common hull design.

At the heart of the DD(X) is the concept of a Navy standard combat system. That system is to be used first on DD(X), and then on other families of future ships. The system could then potentially also be back-fit onto existing ships now in service. A central element of the standard combat system is an onboard computing network that requires a substantially smaller number of IT personnel to the run and administer it.

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To meet that goal, the DD(X) developers came up with the idea of a modular, pre-integrated server core. That core is essentially a room full of server racks the size of the back of a van. Rugged computers aren't required in this "room," because all the ruggedness—the shock isolation, the cooling, the heat and power are all handled at the room level. Filled with around 15 or so racks of server-level computers, this core server room is dropped right into the ship during construction and later upgrade phases.

That strategy makes for a more cost-effective and schedule-friendly way of integrating computing elements on a ship. The approach is a dramatic improvement over the current norm for shipboard computing gear. Today's ships are content with a rat's nest of cables going between rooms and all myriad of standalone computing stations. In contrast, the DD(X) server core links over a small fiber-optic cable going throughout the ship. It's much lighter, easier to maintain and more survivable than what's aboard today's Navy vessels.

Layered Architecture

With the server core at the center, the DD(X) network employs a layered architecture where more of the applications are run in that server core with a high-speed network linked to the various nodes throughout the ship that interface with sensors, weapons and so on. Using a services-oriented architecture, the layered scheme isolates, through middleware, the operating system from the services. That isolation makes is easy to change out the processors with only minor code changes.

The initial core servers for DD(X) were Sun Microsystems SPARC servers running Solaris. The DD(X) program's business model calls for a standards-based competition plan that competes every four years, the most recent of which was concluded late last year. After narrowing the field down to EMC, Hewlett-Packard, Sun and IBM, the final winner was IBM's Opeteron Blade Servers with Red Hat Linux. Compared to its competitors, IBM reportedly had the best cost-model and the best "here and now" high-performance processor solutions.

For the local embedded computing for the ships sensors and weapons electronics, the DD(X) program favors Compact PCI single board computers. The software team has compiled a list of those SBCs in a Total Ship Computing Environment catalog. With LynxOS as their RTOS, those SBCs run the same middleware as DD(X) core servers. The goal is to move as much processing as possible into the core servers, and leave only the barest functionality on the embedded SBCs.

Raytheon Leading the Software Team

Responsible for leading the massive software development work for the DD(X) program is Raytheon Integrated

Defense Systems. According to Bob Martin, Director of System Software Development for DD(X), the program represents the biggest software project that Raytheon has ever done. Even now in the relatively early stages of the program, the company has over a thousand software engineers on the job, including team members from most all of the major defense contractors and a host of smaller companies.

Part of Raytheon's role is to work on the software process with some of the small vendors. For its part, Raytheon is a CMMI Level 4-rated software developer. CMMI (Carnegie-Mellon Software Maturity) is a level of quality and predictability, with ranks ranging from 1 to 5 (5 being the highest). On the DD(X) program, Raytheon is bringing in software developers from small vendors in the ship segment to train and mentor them to get them up to at least Level 3. That's key because for small companies that focus on marine-navigation radar, ship steering control systems and so forth, the world of complex leading-edge software is brand new.

Figure 1

Developed under the DD(X) destroyer program, Zumwalt will be the lead ship in a class of next-generation, multi-mission surface combatants tailored for land attack and littoral dominance. Compared to current U.S. Navy destroyers, the Zumwalt-class destroyer will triple both current naval surface fires coverage as well as capability against anti-ship cruise missiles.

Four years into its work, the DD(X) software development is actually on cost and on schedule—a rare feat in the software realm. And while the DD(X) did face some cuts in the budgets earlier this year, the software portion emerged unscathed. Part of that is because it has performed so well, but that's also indicative of the importance of the computing/software environment: it's what provides the automation in the application layer that allows for smaller IT staff aboard ship, and the reduction of costs associated with that.

Spiraling Out Pieces of DD(X)

Like many of the Military's major programs, DD(X) uses a spiral development strategy that enables pieces of its functionality to get implemented on an incremental basis. Pieces of the TSCEi (Total Ship Computing Environment infrastructure) used in DD(X), which comprises the hardware, software middleware—can be leveraged on board existing vessels. Some of the Navy's amphibious ships are deploying a new Ships Self-Defense System (SSDS) in 2008, and pieces of the TSCEi will be used in that. Pieces of the TSCEi have also been given to the Aegis Destroyer people, also for deployment in 2008.

The idea is cost savings so the Navy doesn't have to invent a new infrastructure of computing environment for every new ship class.

Java is a key technology for the DD(X). The Navy's Open Architecture Computing Environment (NOACE) has been made the standard for all future software systems on Navy warships. That includes shipboard weapon systems, such as anti-aircraft cannon controls as well as avionics systems aboard naval aircraft. The standard calls for all new software to develop in either C++ or Java, and makes specific mention of moving away from Ada. In DD(X) software developers have pushed the envelope of Java real-time garbage collection technology. Release 4 of the DD(X) software environment will switch completely to a real-time Java VM.

Zumwalt the First DD(X) Ship

In early April of this year, the Navy announced that the first DD(X) destroyer will be designated DDG 1000. As the lead ship in the class, it will also be named "Zumwalt" in honor of former Chief of Naval Operations (CNO) Admiral Elmo R. Zumwalt, Jr. Developed under the DD(X) destroyer program, Zumwalt is the lead ship in a class of next-generation, multi-mission surface combatants tailored for land attack and littoral dominance.

Compared to current U.S. Navy destroyers, the Zumwalt class destroyer will triple both current naval surface fires coverage as well as capability against anti-ship cruise missiles. It has a 50-fold radar cross section reduction from current destroyers, improves strike group defense tenfold and has 10 times the operating area in shallow water regions against mines.

Last year, Congress fully supported the DD(X) budget request, and the Zumwalt class is ready to start construction. In November 2005, the Department of Defense granted Milestone B approval, authorizing entrance into Phase IV of the program, including the detail design and construction of the two lead ships. Under the Navy's dual lead ship acquisition strategy proposed in the President's budget for fiscal year 2007, Northrop Grumman Ship Systems and General Dynamics Bath Iron Works will concurrently build the dual lead ships. Zumwalt is scheduled to be delivered in 2012. ▮▮

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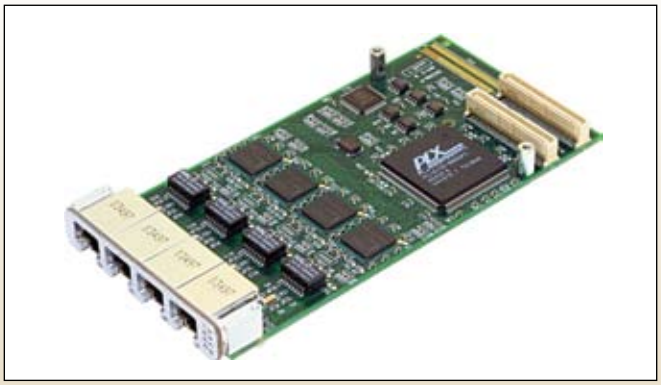
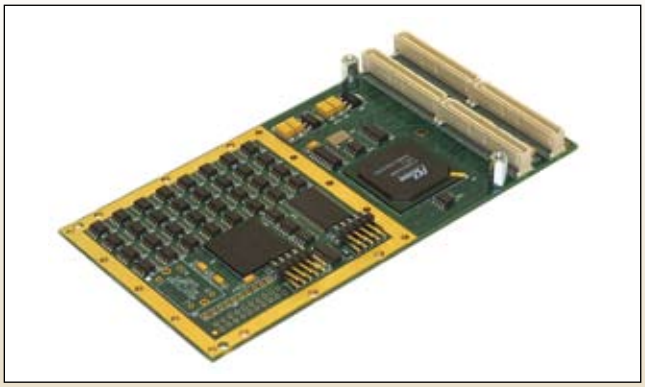
Technobox P/N 4435



Technobox 4435 Quad 82551ER 10/100-TX Ethernet PMC with Front Panel I/O

The Technobox 4435 Quad 10/100-TX Ethernet Adapter, which is built around Intel 82551ER Ethernet controllers, provides four 10/100 Ethernet connections. The module supports either front-panel connectivity or rear I/O accessibility using a VITA 36 PIM module (for example, Technobox P/N 4516). For front panel I/O the module presents four RJ-45 connectors, one for each port, eliminating the need for cumbersome cable adapters. Transformer based electrical isolation is provided between the 82551ER and the I/O connectors. The connection to the 32-bit, 66 MHz PCI bus is through a PLX 6150B bridge. When host software properly configures the bridge, each 82551ER controller appears as if it were an independent controller on the primary side of the bridge. The 82551ER Ethernet controllers feature an integrated MAC and PHY for operating at either 10 Mbps or 100 Mbps (full-duplex). Each port is programmed with a unique 48-bit MAC address that is stored in EEPROMs. Each port has a dual-color LED that provides a ready indication of link mode/status and activity.

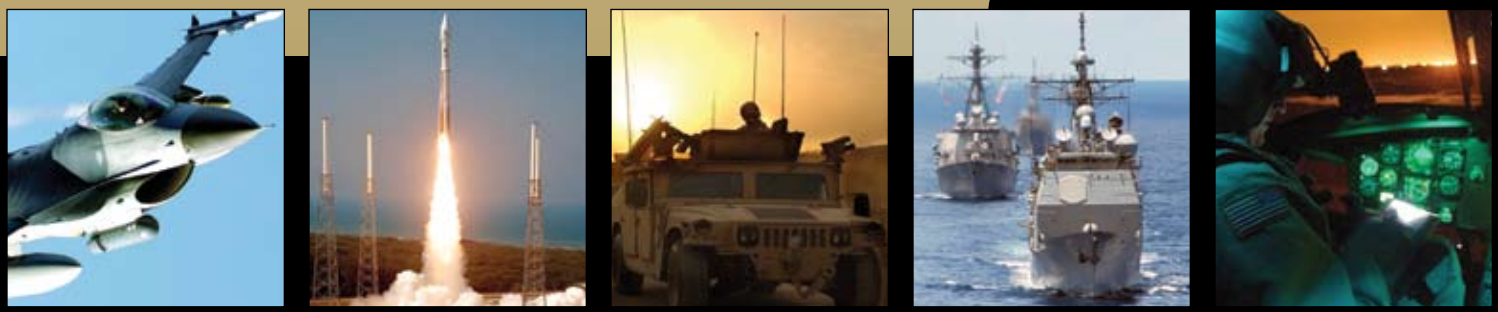
Technobox P/N 4792



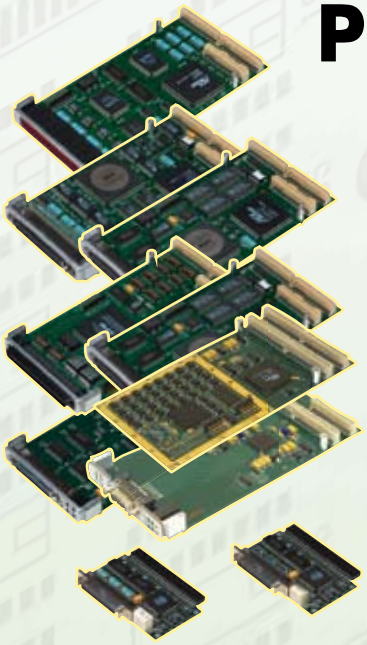
Technobox 4792 Enhanced 32-Channel Reconfigurable RS485/422 Differential Digital PMC—Conduction Cooled

The 4792 is a conduction cooled version of the Technobox 4289. Like the 4289 the module provides a vehicle for implementing complex user-specific digital designs requiring a differential interface. Designed around an Altera Cyclone FPGA, the 4792 provides thirty-two, general-purpose RS422/RS485 driven, digital I/O differential pairs wired to the rear PN4 connector. The module is ruggedized and features additional anti-fretting holes per a recent revision of the VITA 20 standard. There is also a secondary thermal interface for heat conduction.

The standard, stocked 4792 features an FPGA with 12K logic elements. On power up, the FPGA configuration cells are automatically loaded from serial EPROM. An end user can override the default configuration by dynamically reprogramming the FPGA from the host processor or by in-circuit burning of the re-programmable FLASH EP1CS4. Two 10-pin headers are provided for development with ByteBlaster cables — one for the JTAG connection and the other for programming the EP1CS4.



PCI-to-PMC

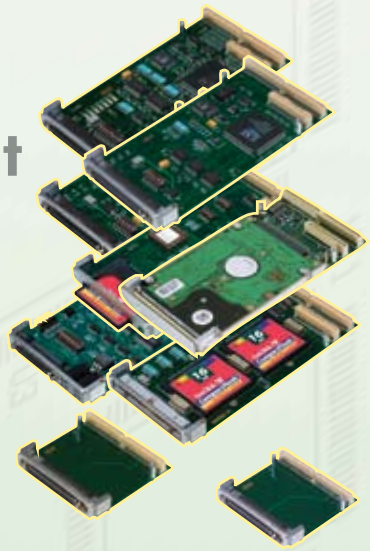


Serial

Ultra320

FPGA

Quad Ethernet



Adapters

SCSI

Async

SATA

Reconfigurable

RoHS

CardBus

IDE

Digital I/O

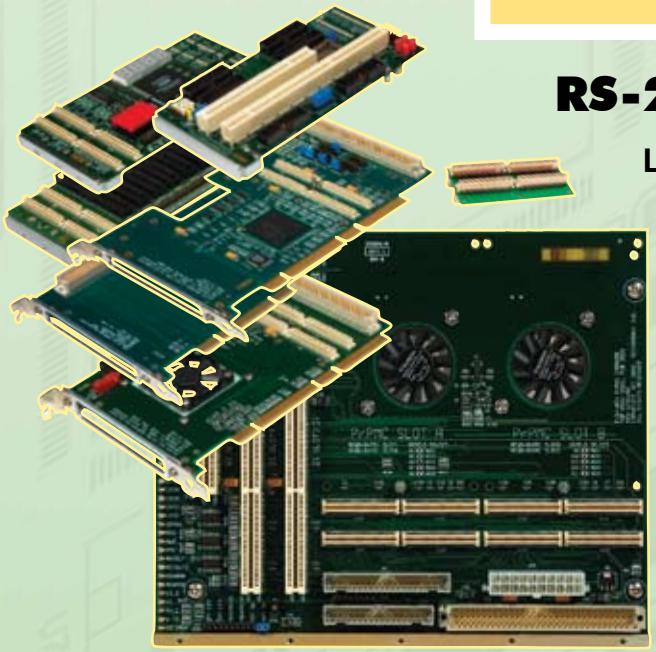
CompactFlash

Fast/Wide

PrPMC

SAS

PMC-to-PCI



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Main Feature

Military Batteries

New Technologies Vie to Close the Battery Power Gap

Most of the electronic gear carried by foot soldiers runs on batteries, and as the amount required continues to escalate, problems in providing sufficient power can threaten to limit the duration of missions.

David B. Cotton
Contributing Editor

As the amount of electronic gear carried by modern Warfighters continues to grow, escalating power and energy requirements can cause real challenges in the operation of these devices and can potentially limit the duration of combat missions. The popular military trend toward the use of wireless technologies, such as WiFi, compounds these power problems as WiFi proves to be quite power-hungry. Today, batteries remain the primary sources of power for small handheld and wireless devices carried by soldiers and marines, who—for extended missions beyond the normal lives of these batteries—must either carry extra batteries as replacements or employ some method of recharging their original batteries.

For the past decade, battery energy density has generally increased in a fairly linear fashion, while the energy requirements of the devices being carried have gone up more exponentially. The reason behind this gap is that while the technology of battery energy is developing relatively slowly, the devices being carried are quickly becoming smaller and more sophisticated, incorporating more technology and requiring greater energy density.

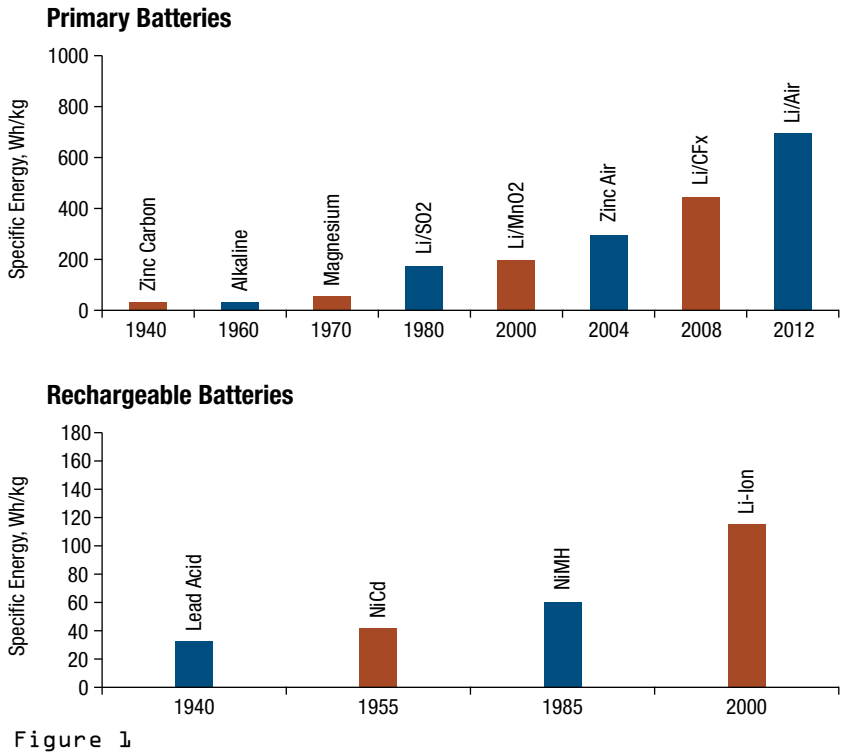

Figure 1

The past and projected growth in battery energy densities for both primary batteries and rechargeable batteries is largely due to changes in the chemistries of the batteries employed. (Source: CERDEC Battery Branch)

Small Disposable and Rechargeable Batteries

CERDEC—the Army's Communications–Electronics Research and Development Engineering Center—has the mission to develop and integrate the Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) technologies that enable information for networked Warfighters. As part of this mission, it also directs and conducts research into military batteries.

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Steve Slane runs the Battery Branch at CERDEC, located at Fort Monmouth, NJ, and he points out that small batteries are either disposable or rechargeable. As already indicated, using disposable batteries may require a Warfighter to carry replacement batteries in order to complete a mission, while using rechargeable batteries, by necessity, requires some means of recharging them either in the field or at the completion of the mission.

For small disposable batteries, Slane expects that military batteries will follow the same trends as batteries being used in industry. However, this is not necessarily the same path that is being followed for standard commercial batteries used to power most consumer electronics. As can be seen in Figure 1, the lithium sulfur dioxide ($LiSO_2$) disposable batteries of the 1980s have largely been replaced by lithium manganese dioxide ($LiMnO_2$) and, in some cases, zinc-air batteries, which provide energy through the reaction between zinc and the oxygen in the air. The move from $LiSO_2$ to $LiMnO_2$ provided an over 50% improvement in battery life, either extending the potential mission time by 50% or cutting the number of batteries that need to be carried by the Warfighter by one-third. Figure 1 shows that zinc-air batteries have the potential of adding an additional 50% improvement over $LiMnO_2$.

Hybrid batteries can also provide an improvement over conventional batteries. Figure 2 shows a sealed lead-acid/zinc-air hybrid used for SATCOM radios. The lead-acid battery is used when the radio is transmitting, while the zinc-air battery picks up the stand-by and receiving load. It also charges the two lead-acid batteries. This hybrid configuration provides three to four times more power than if the Warfighter used two lithium ion or lithium sulfur dioxide batteries to power the radio.

The next future disposable battery technology is expected to be lithium carbon monoflouride (Li-CFX), which is anticipated to provide almost double the energy density over $LiMnO_2$. Further out, CERDEC is looking to lithium-air (Li-Air) batteries with a lithium anode and an air cathode (similar to zinc-air batteries) to be a major energy source for the future.

Rechargeable batteries, however, will probably tend to follow the commercial industry trend of the batteries being used in laptops and cell phones, with the same form-factor, but possibly lighter and

Figure 2

Sealed lead-acid/zinc-air battery hybrid for SATCOM radios. The black box on the right is the zinc-air battery. The two small boxes inside the open enclosure on the left are sealed lead-acid batteries. (Source: CERDEC Battery Branch)

longer-term. As shown in Figure 1, the expected technology trend in rechargeable batteries has been from nickel cadmium (NiCd) to nickel metal hydride (NiMH) and then to lithium-ion (Li-ion), with lithium-ion polymer (Li-Po) and then lithium metal batteries being considered for the future. The move from NiCd to NiMH produced a three-fold increase in battery life, while the shift from NiMH to Li-ion adds another 50%. According to CERDEC, the conversion from NiMH to Li-ion batteries has had multiple benefits, resulted in longer runtimes, lower weights and lower self-discharge as well as easier charging logistics.

Batteries for Larger Vehicles

CERDEC is in the early stages of investigating the use of a large lithium-ion battery to replace the two lead-acid 6TL batteries currently used in vehicles such as the Humvee and the Bradley. This lithium-ion battery could be utilized to start the vehicle as well as to power the onboard communications and electronic equipment when the engine is off. Lithium-ion batteries are believed to provide the advantages of higher energy density, longer cycle life, better shelf life and weight reduction.

Beyond Batteries

Looking beyond batteries, alternative power sources for small devices—such as fuel cells and power harvesting—will continue to attract more attention. Hydrogen reforming in the field, or the conversion of hydrocarbon fuels to hydrogen (H_2), will provide hydrogen to a fuel cell and allow it to operate as long as there is a supply of hydrocarbon fuels. Some hydrocarbon fuels like JP8, the military's standard fuel, will be acceptable for hydrogen reforming on the battlefield, while others, like propane, must be avoided. In some cases, fuel cells can be used in place of batteries, while in other cases they will be used to recharge batteries.

The ready availability of fuel cells that can be used in a battlefield environment should also lead to the development of hybrid power sources, where batteries are the high-power source and fuel cells are the high-energy source, providing longer run times than either separately. For most situations requiring up to 24 hours of systems operation, batteries would be the primary source of power, but for situations requiring a higher power draw or more than 24 hours of operation, hybrid systems would be favored.

In addition, in order to preserve battery power, several power management technologies are expected to come into common use. According to Andrew Girson of In-Hand Electronics, technologies like voltage and clock scaling in CPUs, advanced power modes and power control for CPUs and peripherals will soon become the norm. ■■

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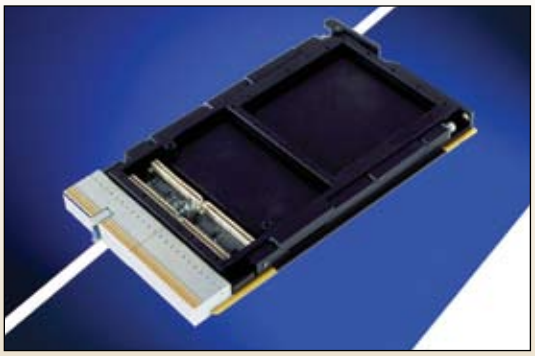
S/DCP3-1201 Ultra Low Voltage Single Board Computer



New Intel® Core™ Duo-based 3U cPCI Single Board Computer

Curtiss-Wright Controls Embedded Computing has introduced the industry's first 3U CompactPCI single board computer (SBC) to feature Intel's 1.67 GHz (@ 15W TDP) Core™ Duo processor. The processor's ultra low voltage operation improves embedded system performance per Watt and is ideal for defense and aerospace platforms in which SWaP (Size, Weight and Power) are critical. The S/DCP3-1201 is also available with Intel's Core™ Solo CPU and can be configured for both air-cooled and conduction-cooled operating environments.

The S/DCP3-1201 provides one PMC expansion site and can also be configured with an optional 1x8 PCIe XMC site on the backside of the card, an embedded industry first. The additional I/O flexibility enables integrators to significantly reduce the volume and cost of complete subsystem solutions. The x86 platform also enables the incorporation of the latest technology in Windows, Linux and Solaris-based embedded systems.

The S/DCP3-1201 is the first of many products to be included in Curtiss-Wright's recently-announced Intel® Core™ Duo processor based SBC designs. Development plans include air-cooled and conduction-cooled ruggedized variants on VME, CompactPCI (cPCI), and VPX (VITA 46) platforms. Curtiss-Wright is also extending its current offering of operating systems with support for Solaris, Windows XP Embedded, and Linux on specific platforms.

8U GLX4000 288-port Switch

Industry's Highest Density Physical Layer Switch

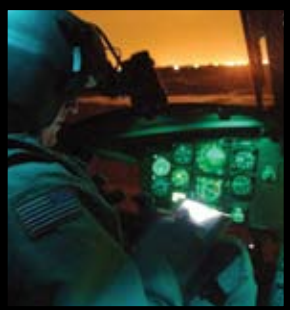
Curtiss-Wright Controls Embedded Computing's "4th Generation" GLX4000 288-port switch, housed in a compact 8U chassis, doubles the port capacity of its predecessor and offers flexible and scalable switching options for a wide variety of high-speed digital signals. The compact 8U design provides the highest port density in the industry, and supports industry-standard protocols such as 1/2/4/10G Fibre Channel, 10/100/1000/10G Ethernet, Firewire, InfiniBand, FDDI, SONET/SDH OC-3, iSCSI and many others are currently supported. Because the switch is truly protocol-independent, even non-standard serial protocols can be easily accommodated.

The 19" rackable GLX4000 288 uses a chassis and blade architecture incorporating up to six hot-swappable 48-port interface blades. Because the blades all connect to a common backplane, the switch's cross-connect functionality extends across any combination of blades and ports. The scalable design provides a cost-effective method to expand as needs grow.

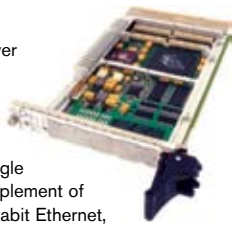
The GLX4000 significantly reduces network setup time versus manual patch panel solutions by "automating" the wiring and configuration process. It also helps to eliminate troublesome wiring errors, increasing the accuracy of the network topology. Additional cost savings can be realized by utilizing the GLX4000 to share expensive resources such as network analyzers, sniffers or data recorders among all network users and departments.







SCP/DCP-122



Designed for space and power constrained applications, the SCP/DCP-122 offers tremendous processing and low power consumption in a ruggedized 3U cPCI Single Board Computer. A rich complement of I/O is available including Gigabit Ethernet, RS-232/422, discrete digital I/O and USB.
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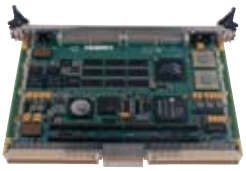

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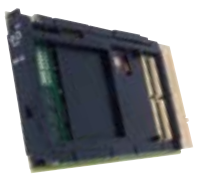

SCP/DCP-124
The SCP/DCP-124 is a high-performance, feature-rich, 3U CompactPCI Single Board Computer based on the Freescale 7447A/7448 PowerPC™ processor with AltiVec technology and up to 1 Gbyte of DDR SDRAM. Includes Gigabit Ethernet, RS-232/422/485, discrete digital I/O andUSB.
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Main Feature

Military Batteries

High-Power Lithium Technology Proves Ripe for Mil Apps

Commercial battery technologies have evolved to meet the military's needs. Lithium solutions are cost-effective, offer long shelf life and instantaneous activation without requiring a squib, heater or heat shield.

Sol Jacobs, VP and General Manager
Tadiran Batteries

The U.S. DoD recently identified the need for a reliable high-power battery for single-use military applications as a "critical problem" demanding significant attention. Demand for high-voltage/high-rate batteries is growing for applications like guidance systems for rockets and missiles, smart ammunition, torpedoes, mines, sonobuoys, unattended ground sensors, UAVs, artillery fuses, active decoy systems, trajectory correction add-on kits, proximity fuses for bombs and sensors for dispersed munitions.

Figure 1

The TLM-1550HP high-power lithium battery from Tadiran Batteries.

These devices require batteries that deliver high voltage and high power rates for short periods of time, ranging from fractions of a second to several hours. Design engineers must consider extremely long shelf life, rapid activation, size/volume/weigh limitations, capacity and energy density requirements, and the ability to test the battery to ensure system readiness. Certain battery technologies also require squibs or gas generators to start the battery, thermal insulation to protect against internal heat and heating elements to ensure reliable operation at low temperatures.

Reserve Batteries

Traditionally, reserve batteries were preferred for single-use military applications because, in most cases, the electrolyte is either stored separately from the rest of the battery or pyrotechnic devices are used to activate the battery, allowing it to remain inert until use. This results in a tradeoff between long shelf life and the inability to test the battery for system readiness. Reserve batteries also require delayed activation until the chemical reaction occurs. Available reserve batteries include thermal, lead-acid, silver-zinc and lithium thionyl chloride.

Thermal batteries contain a metallic salt electrolyte, non-conducting when solid at ambient temperatures, but an excellent ionic conductor when molten. Activated by a squib (pyrotechnic charge), thermal batteries provide a high burst of power—a few watts to several kilowatts—for a short period of time. Advantages include ruggedness, safety, reliability and long shelf life. Thermal batteries have operating temperatures of 400° to 700°C and require insulation to conserve heat and protect surrounding components.

Silver-zinc batteries are complicated systems utilizing a gas generator, tubular electrolyte reservoir, manifold, battery block, vent and heater system. This technology is expensive and has a relatively low energy density. Design times and costs are high, due to the extra components required.

Spin-activated lead-acid batteries, commonly utilized for military fuses and marine applications, store the electrolyte (typically fluoroboric acid) in an ampoule or bladder, which is cut open when the shell is fired, and the electrolyte wets the cell stack via the centrifugal force of the spinning shell. Spin-activated lithium thionyl chloride batteries, often found in

artillery-delivered minelets or communication jammers, are slowed by parachute and must continue to operate for some time after impact. Advantages include very high rates of discharge with no voltage delay. Spin-activated batteries tend to have low energy capacity and relatively long activation times.

A COTS Alternative: High-Power Primary Lithium

Recently, a high-power lithium battery, the TLM-1550HP (Figure 1), was developed by Tadiran Batteries employing the Hybrid Layer Capacitor (HLC) technology found in their PulsesPlus batteries, a widely accepted commercial technology in use worldwide. This AA-size cylindrical cell features an open circuit voltage of 4.0 volts, 2 watt-hours total energy and the capacity to handle 15A current pulses and 5A maximum continuous current at 3.2V. A smaller, 27 mm version delivers 1 watt-hour total energy, and a 20 mm version delivers 0.5 watt-hour.

High-power lithium primary batteries offer a wide temperature range (-40° to +80°C) and up to 20 years of storage life, with self-discharge of 1% per year at room temperature. They can be routinely tested to ensure system readiness, promoting fewer "duds" when utilized in missile systems and other munitions. By combining small cells into various shapes and sizes, battery packs can be made using off-the-shelf products, leading to faster design times and less expense.

High-power lithium batteries are extremely safe and can be shipped as non-hazardous goods, as the solvents are non-toxic and non-pressurized, with a glass-to-metal hermetical seal. These batteries have performed well in safety tests, including nail penetration, crush tests, high-temperature chambers, short circuit and charge tests.

This chemistry does not generate high internal temperatures, eliminating the need for thermal insulation. These batteries also operate at low temperatures, saving space and costs by negating the need for external heating elements. Other advantages include faster activation with instantaneous voltage and no waiting time—with no squibs or gas generators required to start the battery, even after extended storage time. These cells remain "on" for testing all of the time, with proven methods used to ensure that the battery power remains disconnected from the actual weapons systems before use.

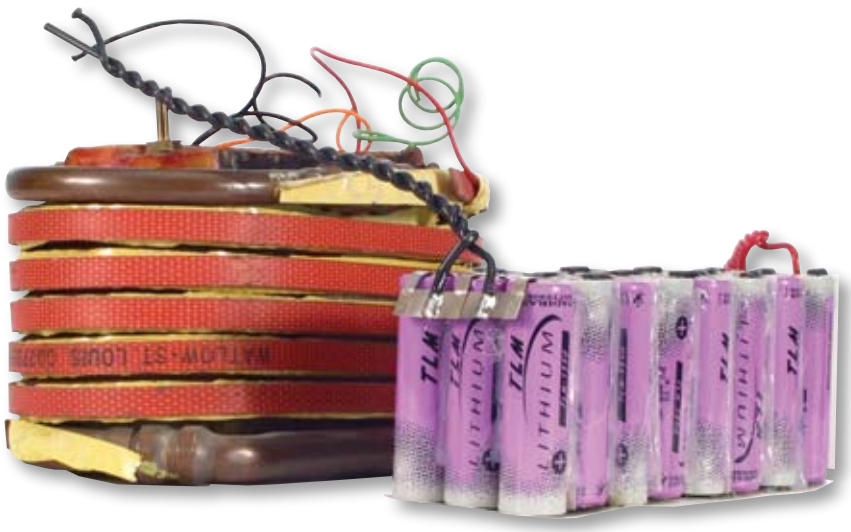

Figure 2

Twenty-four AA-size high-power lithium batteries are still smaller than the silver-zinc battery pack they will replace.

Typical Applications

Typical examples in which high-power commercial lithium batteries have been substituted for expensive custom reserve batteries include:

MOFA fuses for guided artillery shells: The best example of an attempt to standardize batteries for military applications is the Multi-Option Fuse for Artillery (MOFA) battery for 105 mm and 155 mm bursting artillery projectiles. Options considered were lead-acid, thermal and lithium oxyhalide, with lithium oxyhalide selected. By comparison, a high-power lithium primary commercial battery consisting of two 20 mm cells is smaller and lighter, provides up to double the operating time with instantaneous activation and more stable voltage.

Back-up power for UAVs: Previously, in the event of a power failure, UAVs utilized large D-sized cell primary lithium battery packs to operate the guidance system, enabling UAVs to glide to a safe landing. Replacing the larger battery pack with a smaller pack of AA-size high-power lithium primary batteries led to substantial size and weight reductions, extended shelf life and fewer battery replacements.

Primary power for a missile system: Guidance systems on an air-to-ground missile powered by a silver-zinc battery pack will be converted to a pack using 24 high-power primary lithium batteries, resulting in faster production, greater availability, reduced weight and volume, greater energy density and reduced cost. The TLM pack does not need the squib, gas generator and heater associated with the silver-zinc pack (Figure 2).

Powering a guided artillery shell: In guided munitions, a larger reserve battery that delivered medium power, high capacity and low current pulses was converted to a high-power lithium battery pack consisting of four to six 20 mm batteries. This commercial alternative reduced size, weight and cost.

High-power lithium commercial battery technology can successfully compete against traditional reserve batteries, delivering benefits such as greater design flexibility, size and weight reductions and significant cost savings. ▮▮

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4-Slice Multiple Processor Unit (H4S-MPU-HFL)

M4S-MPU-HFL fully enclosed computing platform consolidates up to four single-board computers into one chassis.

General Dynamics' Modular 4-Slice multiprocessor unit (MPU) delivers a combination of four high-performance Sun Microsystems and Intel -based single board computer (SBC) modules, powerful and robust enough for airborne, shipboard, and ground-based operation centers and command posts. Each module operates as a stand-alone workstation with easily accessible motherboard I/O, mouse, keyboard and monitor connections.

M4S-MPU-HFL product overview:

- Centralized chassis management module (CMM)
- Five redundant N+1 power supplies
- Power requirement 20-33 VDC
- Rack mountable
- Qualifications include MIL-STD-810F and 461E

More information: http://chs3.gdc4s.com/M4S-MPU-HFL





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Main Feature

Military Batteries

Extreme Temps Pose Battery Pack Design Challenges

Additional electronics improve the information supplied to the modern soldier, but field conditions can require ruggedized battery packs that will operate within wider temperature extremes.

Jeffrey VanZwol, Marketing Manager
Micro Power Electronics

With the modernization of military armament, soldiers are becoming reliant on mobile power sources. Modern soldiers carry wireless electronic systems to improve situational awareness and communications, equipping them with personal computing and connecting them to centralized command stations.

In addition to the requirements of commercial battery packs, incremental characteristics or design considerations for ruggedized or military battery packs include with/standing extensive shock and vibration, water submersion up to 9m and adequate power in extreme temperatures ranging from -40° to +80°C. In response, battery pack manufacturers are bringing new design techniques to bear in order to extend the operation of battery packs in extreme environments.

Figure 1

The ultrasonic welding of PC or ABS plastic pieces provides a rugged enclosure that retains (and repels) heat and is water submersible.

Selecting the Optimal Cell Chemistry

Active safety circuits, combined with the use of more reactive materials, are required to ensure that certain battery chemistries are kept in stable conditions. Incidents involving battery rupture or explosion are very rare. However, it should be recognized that under certain conditions (like extreme temperatures or puncture), which are more likely in battlefield or emergency services, battery pack integrity can be breached and subsequently expose the user to harmful chemicals or flames.

Portable rechargeable cell chemistries include Alkaline, Sealed Lead Acid (SLA), Nickel Cadmium (NiCd), Nickel Metal Hydride (NiMH) and Lithium Ion (Li-ion). Li-ion provides the highest energy/density for portable or mobile applications. Lithium primary cells are disposable and designed for single use applications. Lithium primary requires minimal protection circuitry as it is used only once and never recharged.

Rechargeable Li-ion requires the greatest degree of protection including a thermal shut down separator and exhaust vents (within each cell) to vent internal pressure,

an external safety circuit, which prevents over-voltage during charge and under-voltage during discharge, and a thermal sensor, which prevents thermal runaway. However, with the appropriate level of safety designed into a Li-ion pack, it offers the most attractive portable battery power. Conventional Li-ion cells operate at -20° to +60°C. A new formulation of cathode/anode material in cells can discharge from -30° to +60°C, while another new formulation can discharge from -20° to +80°C.

Performing in Lower Temperatures

Extended industrial or military requirements may specify extended operating temperatures down to -40°C. Rechargeable Li-ion cells operate at -20° to +60°C. When challenged with this requirement, there are several design options to maximize electrical output at low temperatures.

The host device can be designed to pulse discharge the cells prior to the primary discharge cycle, self-warming the cells via the I^2R heating effect. This technique is applicable when the duty cycle is predictable and cyclical (the periodic transmission of GPS position report), rather than a random or haphazard duty cycle (handheld radio transmission). Additionally, supercapacitors embedded within the pack can provide immediate energy to a host device while cells warm up to their optimal electrical performance.

A heater embedded within the pack can warm cells prior to use. The embedded heater can be powered from the main cells within the pack or an external source (charger or another battery pack). Embedded heaters can heat cells, reduce electrolyte viscosity and reduce voltage droop or delay prior to use.

Another consideration is the composite material and wall thickness of battery pack enclosures. Enclosures are made from PolyCarbonate (PC), Acrylonitrile Butadiene Styrene (ABS), PC/ABS blends and Fire Resistant (FR) additives. Ultrasonic welding can be used to seal pack enclosures together, providing an airtight pack with superior heat retention. Alternative methods of sealing, such as glue or snap-tight enclosures, do not provide such a tight seam.

Within the pack, insulation can be used to retain heat, as well as absorb shock and vibration for the enclosed printed circuit board and cells. Typical insulating material includes vulcanized rubber, polyaramid paper, or polyimide film. These insulating materials, when applied with adequate thickness, withstand temperature changes without shrinkage and deformation.

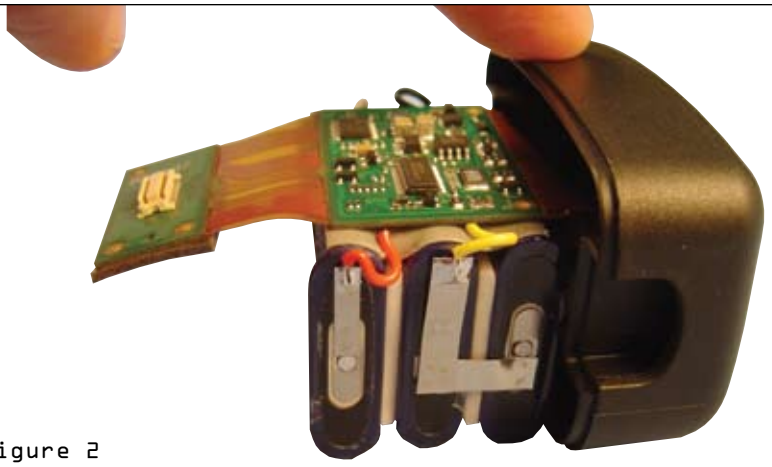

Figure 2

Printed circuit boards should be insulated from cells and avoid placement near any hot zones created by cells.

Performing in Higher Temperatures

High temperature extremes can pose design challenges for battery packs. Mil-spec requirements may specify extended operating temperatures up to 80°C. Again, most commercial Li-ion cells are specified to operate from -20° to + 60°C, so thermal monitoring and heat dissipation within the battery pack is critical for high-temperature operation.

When current is introduced (charge) or removed (discharge) from a battery at a high rate, there is an associated temperature increase, which can be dangerous. The pack circuitry should use a thermal sensor to disconnect the cells at a specified temperature. This eliminates thermal runaway and overheating.

Placement of circuitry within the pack is critical. The printed circuit board may have heat-generating components, such as Field Effect Transistors (FETs), and improper placement may result in an FET heating the cells. The application of heat to cells within a pack erodes the longevity and safety of that pack. Therefore, printed circuit boards should be insulated or shielded from cells, especially for high-temperature environments.

A final consideration is the position of the pack in relation to heat-generating components, such as high performance processors, operating within the host device. Uneven heating may cause the cells to behave differently from their companions in the pack, shortening the pack life and compromising safety.

As a last resort, if these design techniques cannot extend the operational range of a Li-ion pack to the required temperature, one should consider utilizing disposable Lithium primary cells to power the device, as these cells have an operational range of -40° to +80°C with very low self-discharge. Lithium Manganese Dioxide (Li/MnO_2) formulations provide less voltage droop than Lithium Sulfur Dioxide (Li/SO_2) and Lithium Thionyl Chloride ($Li/SOCl_2$) formulations in cold temperatures.

These are several methods used to design ruggedized battery packs for military or industrial applications. As additional electronics improve the information supplied to the modern soldier in the field, battery packs will be needed to power these devices in wider temperature extremes. ▮▮

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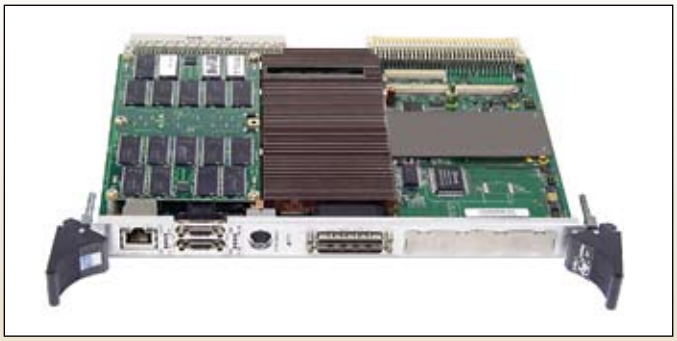
For more information: Contact Themis at info@themis.com or call 510-252-0870.

Themis TA64™



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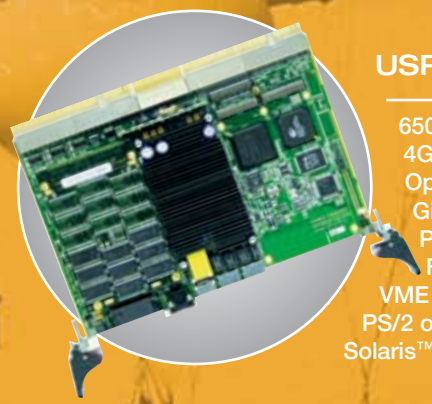

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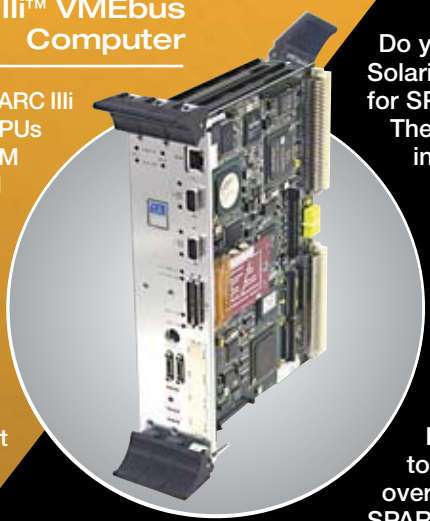

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Bus	AT Expansion Bus					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	PCI Universal Expansion Bus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
	PCI Bus Masters	4	4	4	4	4	4	4	4	4	4		4	4		
	APIC (add'l PCI interrupts)	9	9	9	9	9	9	9	9	9	9					
CPU and BIOS	CPU Max Clock Rate (MHz)	1400	1400	1000	1000	650	650	650	650	650	650	333	333	333	100	100
	L2 Cache	2MB	2MB	512k	512k	256k	256k	256k	256k	256k	256k	16K	16k	16k	16k	16k
	Intel SpeedStep Technology	✓	✓													
	ACPI Power Mgmt	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0					
	Max Onboard DRAM (MB)	512	512	512	512	512	512	512	512	512	512	256	256	256	32	32
	RTD Enhanced Flash BIOS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Nonvolatile Configuration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Quick Boot Option Installed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Fail Safe Boot ROM					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	USB Boot	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Peripherals	Watchdog Timer & RTC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	IDE and Floppy Controllers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	SSD Socket, 32 DIP						1		1		1	1	1		2	1
	ATA/IDE Disk Socket, 32 DIP	1	1	1	1	1		1		1				1		
	Audio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	Digital Video	LVDS	LVDS	LVDS	LVDS			TTL	TTL	LVDS	LVDS	TTL	TTL	TTL		
	Analog Video	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA	SVGA		
	AT Keyboard/Utility Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	PS/2 Mouse	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	USB Mouse/Keyboard	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
I/O	RS-232/422/485 Ports	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	USB 2.0 Ports	2	4	2	4											
	USB Ports					2	2	2	2	2	2	2	2	2		
	10/100Base-T Ethernet	1		1		1	1	1	1	1	1	1	1	1		
	ECP Parallel Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	aDIO(Advanced Digital I/O)	18	18	18	18	18	18	18	18	18	18	18	18	18		
	multiPort(aDIO, ECP, FDC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
SW	ROM-DOS Installed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DOS, Windows, Linux	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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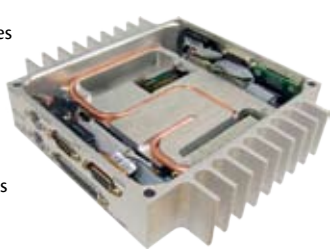

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Bus	AT Expansion Bus	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	PCI Expansion Bus Master	✓	✓				✓							✓
	McBSP Serial Ports	✓	✓				✓							
Analog Input	Single-Ended Inputs	16	16	16	16	16	16							
	Differential Inputs	8	8		8	8	8							
	Max Throughput (kHz)	1250	1250	40	500	100	1250							
	Max Resolution (bits)	12	12	12	12	16	12							
	Input Ranges/Gains	3/7	3/7	3/1	3/4	1/4	3/6							
	Autonomous SmartCal	✓	✓											
	Data Marker Inputs	3	3		3		3							
Conversions	Channel-Gain Table	8k	8k		8k	8k	8k							
	Scan/Burst/Multi-Burst	✓	✓		✓	✓	✓							
	A/D FIFO Buffer	8k	8k		8k	8k	8k							
	Sample Counter	✓	✓		✓	✓	✓							
	DMA or PCI Bus Master	✓	✓		✓	✓	✓	✓						✓
	SyncBus	✓	✓				✓							
Digital I/O	Total Digital I/O	16	16	16	16	16	16	16	48	18/9	32	64	32	48
	Bit Programmable I/O	8	8		8	8	8	8	24	6/0				48
	Advanced Interrupts	2	2		2	2	2	2	2					2
	Input FIFO Buffer	8k	8k		8k	8k	8k							4M
	Opto-Isolated Inputs										16	48	16	
	Opto-Isolated Outputs										16	16		
	User Timer/Counters	3	3	3	2	3	3	3	3	3				10
	External Trigger	✓	✓		✓	✓	✓	✓	✓					✓
	Incr. Encoder/PWM									3/9				
	Relay Outputs												16	
Analog Out	Analog Outputs	2	2		2	2	2	4						
	Max Throughput (kHz)	200	200		200	100	200	200						
	Resolution (bits)	12	12		12	16	12	12						
	Output Ranges	4	4		3	1	4	4						
	D/A FIFO Buffer	8k	8k				8k	8k						

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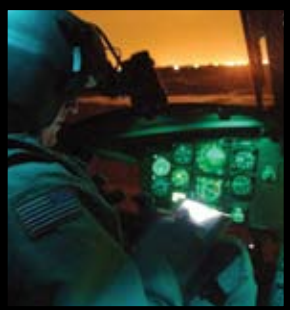

Tech Recon

FCS Tech Update

2006 a Critical Year for FCS Program

A mix of key reviews and experiments this year lead up to the first FCS technology spin out to Current Forces scheduled for 2008.

Jeff Child
Editor-in-Chief

This year continues to be a busy and important year for the Army's Future Combat Systems (FCS) program. FY06 will be a critical execution year with 52 major reviews scheduled, broad industry ramp-up on network and system platforms, and extensive software and hardware deliveries. With the System of Systems Functional Review completed successfully last August, the program is now in its Integration Phase 1. The first major field experiments—Experiment 1.1, JEFX06—are going on this year and into the next, all working toward the first "spin out" of FCS technologies to the Current Force scheduled for 2008.

Looked at from the broadest view, FCS is essentially the materiel solution for the Army's modernization program. The Army is transforming from a Division-based structure to a Brigade Combat Team (BCT). FCS is a family of 18 manned and unmanned systems, connected by a common network. The soldier is the key part of that network. Types of systems include manned and unmanned ground vehicles, manned and unmanned air vehicles and a variety of other systems including Intelligent Munitions, Ground Sensors and Non-Line of Sight launch systems (NLOS-LS).

The Joint Expeditionary Force Experiment 2006 (JEFX06) began earlier this year and will run through Q406. JEFX06, underway at the Nevada Test and Training Range, is essentially a dress rehearsal for the more formal Experiment 1.1, which will begin in Q406 and run through Q207. Experiment 1.1, to run at the White Sands Missile Range, will be the proving ground to demonstrate FCS technology with Current Force vehicles such as Abrams, Bradleys and HMMWVs. It will show connectivity between vehicles with FBCB2—showing Blue Force/Red Force tracking—and with unmanned assets like the Unmanned Ground Sensors and Intelligent Mine System. The test will include control of an intelligent mine field.

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First ICS to Ship This Fall

To support Experiment 1.1, the team developing the FCS Integrated Computer System (ICS)—General Dynamics and Rockwell Collins—plan to ship the first ICS units this fall. The ICS is the common computing environment for 17 of the 18 platforms in the FCS "system of systems." Last year, the team chose LynuxWorks as the embedded operating system vendor for the ICS COE (Common Operating Environment). For that COE, LynuxWorks is working to blend its non-time-space partitioned product called LynxOS with its LynxOS-178 time-space partitioned OS.

The roadmap for the ICS includes multiple versions designed to support near-term and long-term FCS platforms. The unit under development for the spin outs into Bradley, Abrams and HMMWV vehicles is the Large Networking Processor. The system is based on 3U CompactPCI, and the board suppliers for it have been selected, but not publicly announced. Following a mandate for ICS to use x86 architecture, the Pentium M was chosen the best performance/power option available in the timeline needed for the Large Networking processing, although designers can look at dual-core CPUs for the future. The system embeds a 10-port Gbit Ethernet switch and a high-speed serial switched fabric (although which fabric that is has not been publicly announced).

Looking further down the FCS ICS roadmap, the ultimate goal is to have one main version called the Common Networking Processor, with two smaller versions for smaller platforms. The Common Networking Processor—like the Large Networking Processor—will be a mixture of processing and networking elements, probably using VITA 46 boards. The Medium Networking Processor is a smaller version of ICS for use in the Class III UAV. And finally, the Nano Networking Processor is envisioned as an ultra-low-power, integrated computer for battery-powered systems such as the SUGV (Small Unmanned Ground Vehicle) and the Class II UAV.

Among the design considerations for the ICS, compute density is the priority. The more processing muscle that can be packed into a small space, the better. Also key is efficient multi-processor communications. The FCS comms network will be tasked to link to JTRS, WNW, SRW and WIN-T. Ranking as perhaps the trickiest design challenge is the thermal issue that comes with packing a lot of computing into a small space. For their part, Current Force vehicles have no real cooling solution. And while the Future Force (FCS) vehicles have better cooling solutions, they will embed more electronics and will therefore have more power to dissipate.

Security Concerns

Partly because the information and databases on the FCS networks are na-

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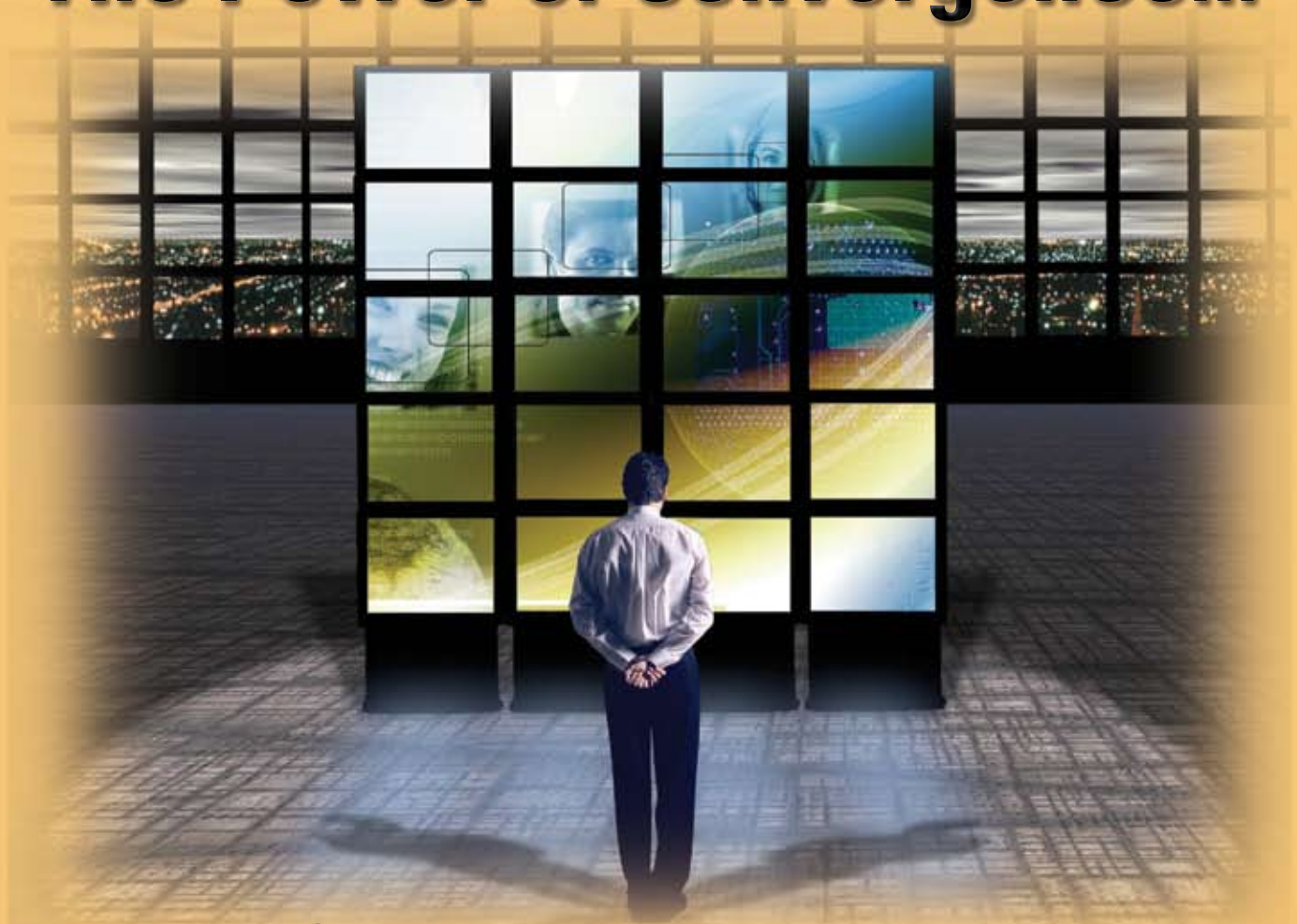

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ISC Commonality across all platforms in FCS

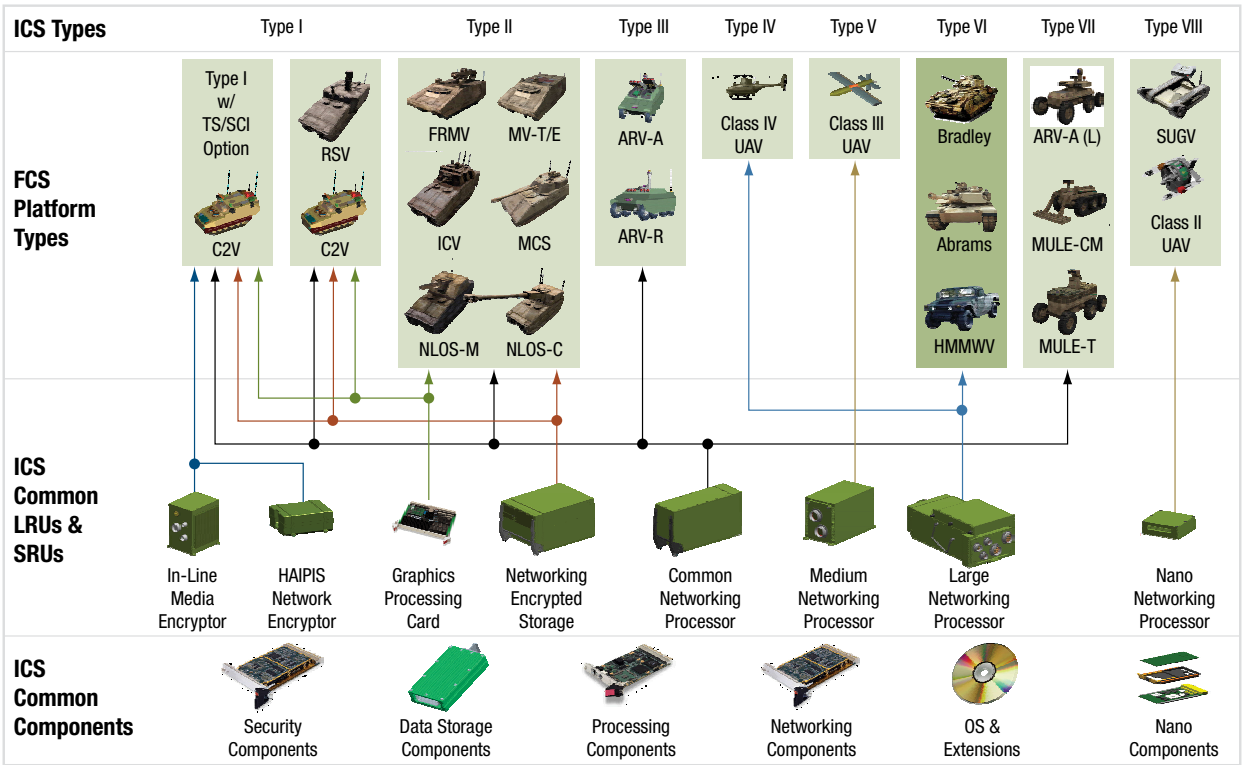

Figure 1

The roadmap for the ICS includes multiple versions designed to support near-term and long-term FCS platforms. The unit under development for the spin outs into Bradleys, Abrams and HMMWV vehicles is the Large Networking Processor. The ultimate goal is to have one main version called the Common Networking Processor, with two smaller versions—the Medium and Nano—for smaller platforms.

tional assets, but also because enemy access to it threatens our Warfighters, security is also a critical design consideration for the ICS. To provide Information Assurance, developers are looking at leveraging work underway for the MILS Separation Kernel Protection Profile (SKPP) by the NSA, LynuxWorks, Wind River Systems, Green Hills Software and Objective Interface Systems. At a MILS Demo Day held in late April by The Open Group, SKPP was demonstrated to the public as a technology good for single platforms, but the ICS design team is pushing for adapting it for big distributed networks, like FCS.

The most expensive program in the Army's history, FCS is estimated to cost over $100 billion over the life of the program. It's certainly pushing the envelope of wireless networking, security, RTOS, chip integration and embedded computing technology. But it will need more than technical dazzle to avoid future budget trimming. The program's spin out strategy and usefulness to the Current Force will be a big factor in the program's chances of maintaining its funding. Without a doubt, the 2006 through 2008 period of experiments and demos are critical for FCS. ▮▮

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Reliability Issues Stir Up the ESS Waters

Environmental Stress Screening is a useful tool. But predefining an ESS vibration profile can pose a risk to reliability.

John Starr, Engineering Consultant
CirVibe

Environmental Stress Screening (ESS) has proven an effective tool for evaluating the ruggedness of electronics-based systems. ESS exposes products to various environmental conditions to find infant mortalities resulting from part and workmanship defects. But ESS must be used carefully or it can reduce the reliability of the components under test.

Development of a reliable product for harsh military environments has two primary parts. On one hand the product must have the ruggedness capable of surviving the field environment and meeting reliability goals. On the other hand, the production process must be capable of producing a reliable product, free of production defects that can fail prematurely during service life.

The former above is accomplished by the design engineering department. The latter is the job of production engineering and when necessary, assured by post production Environmental Stress Screening.

Problem of Predefining Profiles

ESS is difficult for electronics because electronic systems are complex and rapidly evolving with changing component details—leadwire pitch, component type, solder type (RoHS) and so on. Design methods and ESS must evolve with the product. For military electronics, the ESS vibration profile is often specified by the customer when a product is ordered—sometimes before the product is designed. This ESS specification occasionally allows profile notching for

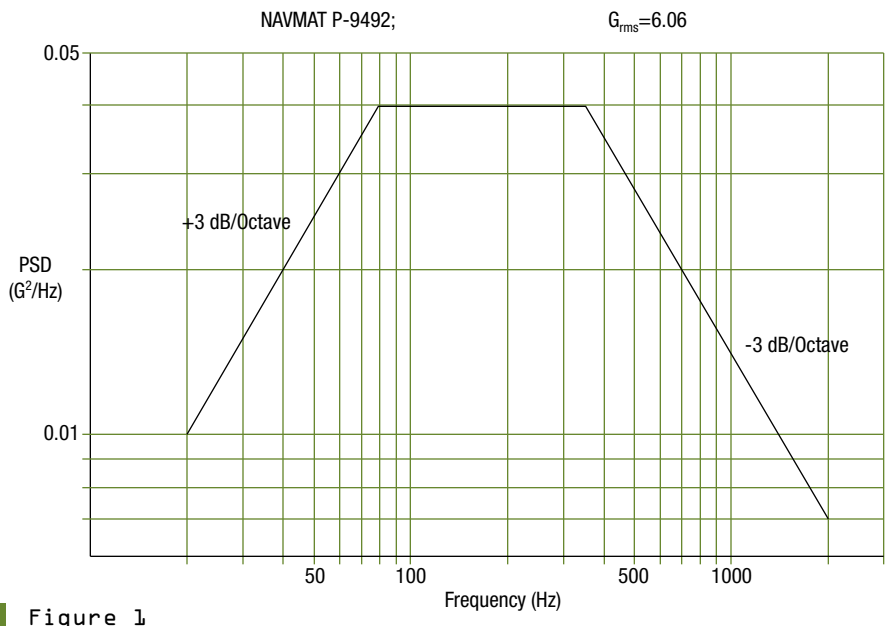

Figure 1

In 1979, the Navy published vibration screening guidelines that have been broadly adopted. Though these guidelines clearly stated that there is a need to customize product screening, many adopted the suggested "starting point" vibration profile directly from this profile. This is the most common predefined ESS profile. Many still use it today, some not knowing how or why it should be modified.

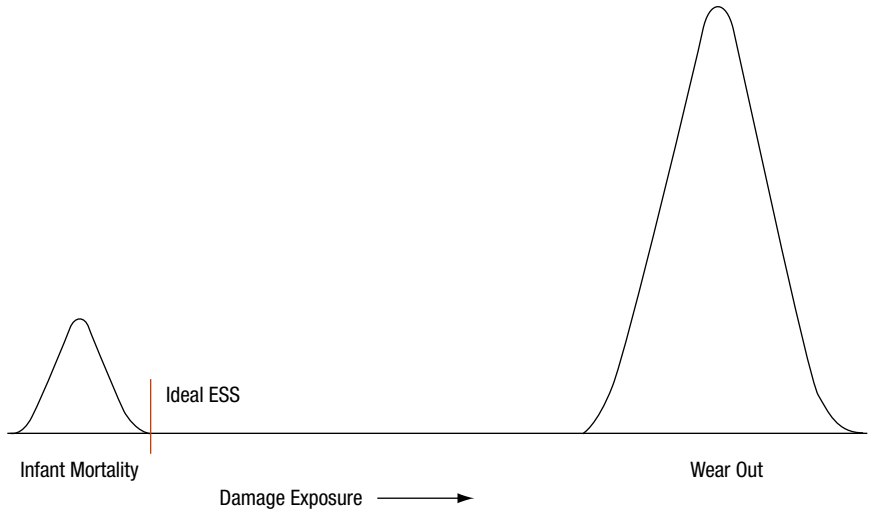

Figure 2

In the bathtub curve, ESS exposes the product to damage that exceeds the infant mortality damage, shown here as "Ideal ESS." This works well with simple products. But military electronics systems are not simple. The product can fail in service life due to thermal cycling or vibration response.

overdriven resonances. The problem is, this method can be adequate for Line Replaceable Units (LRUs) for finding assembly problems such as loose parts or other mechanical components, but it is totally inadequate for circuit card parts.

Effective ESS avoids damaging fragile parts while at the same time adequately exposing areas of risk. The chances that a predefined ESS profile would be effective and non-damaging for circuit card assemblies will not be slim, it will be none. Acceptance of a predefined ESS vibration profile has a high risk of being an acceptance of lowered reliability.

ESS History

In 1979, the Navy published vibration screening guidelines that have been broadly adopted. Though these guidelines clearly stated that there is a need to customize product screening, many adopted the suggested "starting point" vibration profile directly from the document (Figure 1). Many still use it today, some not knowing how or why it should be modified. This is the most common predefined ESS profile.

There are a number of complexities that affect circuit card life. Circuit cards can be very flexible or can be stiffened by frames. Components can significantly affect the local stiffness. Cards can be supported by standoffs, wedge-locks, connectors and frames. In addition, stiffeners, screws, standoffs, board cutouts, or other components can act as "stress risers." Under random vibration, stresses from multiple mode shapes cycle for every part. In addition, electronic products have many physical dimensions and material properties that cannot be tightly controlled, yet are very critical to life.

An example of circuit card evolution is RoHS compliance. The RoHS (Restriction of Hazardous Substances) initiative goes into effect July 1, 2006, and restricts the use of six hazardous materials in electronic equipment, including lead in solder. This will affect COTS parts. Designers must assess the impact of RoHS on their design rules. It will also impact ESS. Of course, this is only one example of the continuous change in circuit card configuration growth.

ESS and Product Life

ESS exposes hardware to environmental loads aimed at preventing infant product failures by creating stress cycles that accumulate fatigue damage. This can precipitate flaws to failure, but every load cycle uses some portion of available product life. Temperature cycling and vibration are commonly used stress screens. Thermal cycling ESS affects all parts but is also highly damaging and requires a long test period. Vibration is excellent for accumulating damage through high cycles in a short time, but there are large differences in damage based on component position. Creating an effective screen requires an understanding of the product at point-of-failure level, matching the needs of the particular product.

For any type of ESS, if the screen is too intense, it uses too much of the product's life and can cause early service life failures. If the screen is too mild or uses the wrong profile or support mode, a flawed product can pass ESS, only to fail early in field use. An effective screen creates enough damage at risk locations to turn flaws into detectable failures.

Methods that depend on field failure experience to improve product or ESS procedures, as in the case of a predefined screen, are not very effective. Shipping a flawed product can affect a product's reliability and the company's reputation. There are a number of terms that correspond to the difficulty of defining an effective stress screen for electronics. These include "each electronic product is unique," "cannot duplicate failures," "no fault identified" and "re-test OK." Such phrases are common because of the statistical complexity of test control, test product variation as well as the scatter in fatigue failures for electronic systems.

Failure Tradeoffs

Tests can generate real failures, but they cannot generate much information about the failures. For most components on modern electronic circuit cards, the most severe stresses under vibration result from card deformations (not inertial loading) defined by mode shapes at natural resonances. Since a test cannot provide any measurements descriptive of the point of failure, testing alone is a difficult approach to gaining knowledge about a product and its life capability under vibration.

The concept of exposing a product to significant damage to eliminate infant mortality is simple. In the bathtub curve, Figure 2, ESS would expose the product to damage that exceeds the infant mortality damage, shown in the figure as "Ideal ESS." This works well with simple products. However, circuit cards are not simple. The product can fail in service life due to thermal cycling or vibration response. Product flaws can be found by exposure to vibration and/or thermal cycling.

Vibration is the most efficient means of generating a high number of stress reversals in order to find flaws. But the ESS must not use too much life of the weakest component. Every design has a "weakest" component for a defined support condition and excitation profile. With many of the other components experiencing only a very tiny fraction of damage (relative to the weakest component), will they be adequately damaged to find flaws?

Military and aerospace circuit cards can cost tens and even hundreds of thousands of dollars each. Testing of many parts to gain product knowledge for optimizing screens is often cost-prohibitive. There is a need to get the maximum amount of information available in any test performed.

To create the ideal customized screen, a detailed understanding of the product's response to vibration is required. Damage from vibration should be fully understood at the point where failure occurs. Gaining point-of-failure understanding requires detailed analysis. An advantage of including detailed analysis is that information gained from one design is transferable across design configurations. Physics of Failure (PoF) analysis is the application of engineering, science and mathematics for product evaluation at point-of-failure level. PoF analysis can translate test measurements into numerical definition of component life-use (fatigue damage). Tailoring ESS involves modifying controllable parameters to optimize screen efficiency. The two primary variables that are within the control of the screener are fixturing (how the test item is supported), and the vibration profile (including duration).

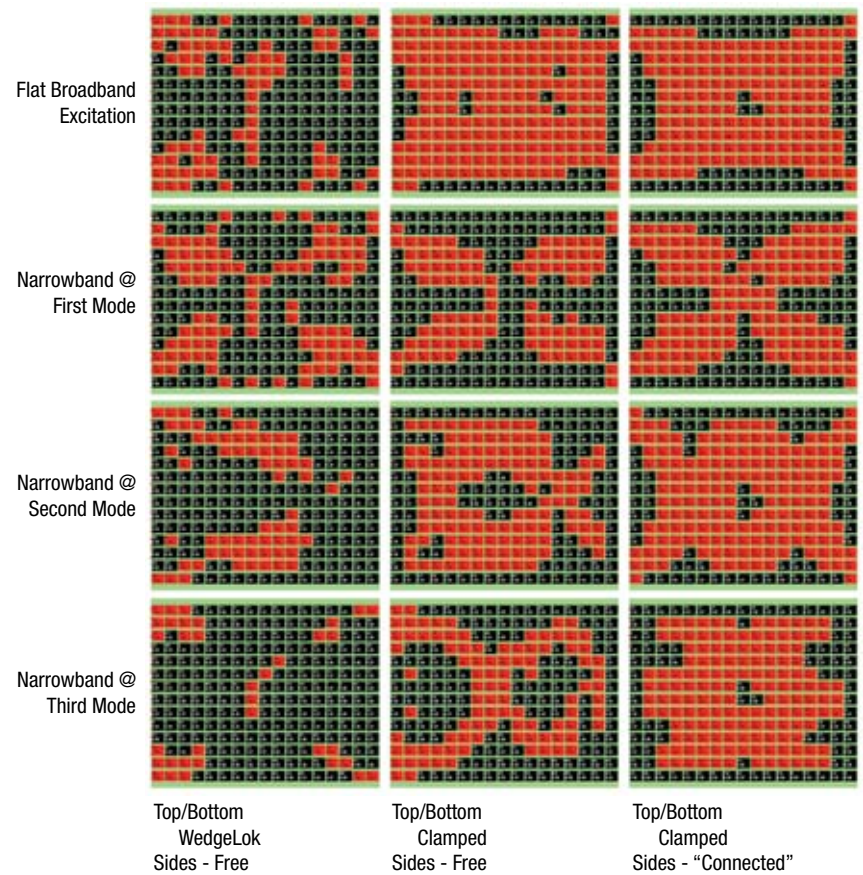

Figure 3

Shown here is the position-dependent damage distribution potential for a single card for three support conditions and four vibration profiles. The red part of the plots shows the areas of high life-use, the black shows lower-used areas.

Physics of Failure (PoF)

PoF detailed analysis of a circuit card demonstrates how a predefined ESS vibration profile will not meet the criteria of being effective and not excessively damaging. ESS process development is far more difficult than design of the product. The designer only needs to develop a product that will meet or exceed the service life goals. Over-design does not imply increased cost, it just requires increased product understanding.

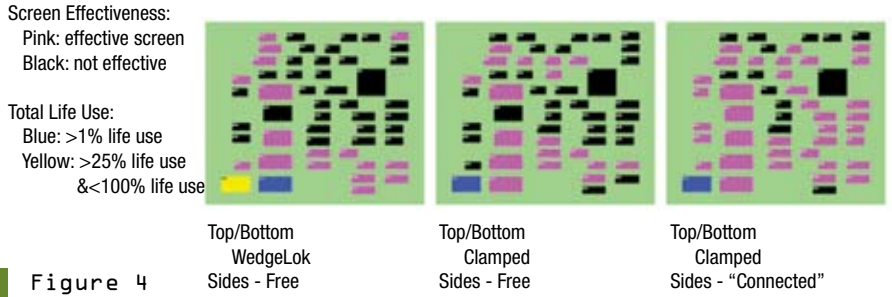

Figure 4

Shown here are the damage plots for an actual design with support conditions matching those from Figure 3.

Fatigue failures are dominated by high stress cycles because there is an exponential relationship between the damage caused by a stress cycle and the amplitude of that stress cycle. This exponential relationship is represented by the high-cycle portion of the fatigue curve of the material at the point of failure.

Highest stresses occur at structural resonance. These resonances can be the vibration of the component itself or of the card assembly. Since local modal circuit card curvature can define the dominant stress in a weak component, component positions are very critical to determining product ruggedness.

The concept of "damage distribution" is important when creating and evaluating vibration screens. The CirVibe software package, a purpose-built PoF program for life-use analysis of circuit cards exposed to vibration, was used in the analysis for the Figures 3 and 4 on vibration fatigue damage.

Position-Dependent Damage

Consider the position-dependent damage distribution potential for a single card for three support conditions and four vibration profiles. As Figure 3 shows, the red part of the plots shows the areas of high life-use. A component in the worst position of the red area could experience 10,000 times as much damage as a component in the best position of the black area. The plots demonstrate that the life-use in every position is very dependent on both support condition and excitation profile. A vibration screen must expose any risk area to adequate life-use to find flaws without using excessive life of the weakest component. A screen supported by PoF analysis and customized to the product is required for high reliability.

Figure 4 shows damage plots for an actual design with support conditions matching those from Figure 3. These three life plots were determined by analysis of actual components. All plots have the same vibration requirement profile and screen profile. All plots show which components would be effectively screened and those that would not. There is no vibration profile or support condition that will screen everything. A perfect vibration screen is impossible due to the exponential stress/life-use relationship.

Reliability can be reduced by misuse of ESS—a procedure that is intended to enhance reliability. Developing ESS for electronics that is both effective and not excessively damaging requires in-depth product understanding. There is a zero probability that a predefined ESS vibration profile will meet these goals. Since ESS can be a critical part of achieving reliability, ESS procedures should be defined by the developers who understand the product at point-of-failure level. ESS vibration profiles should not be defined by marketing departments or the customer. ■■

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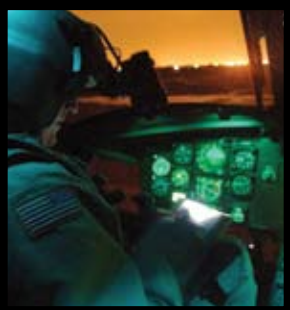
- D/A: 8 channels, 16-bit DAC, 80.8KHz
- DIO: 16 TTL
- Counter/timer: 32-bit







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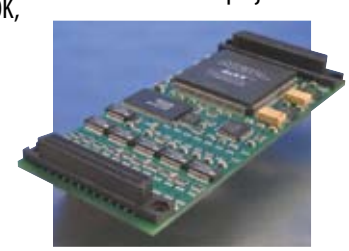

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VITA Standards Update

John Rynearson, Technical Director
VITA

The following is an update on the standards under development by the VITA Standards Organization (VSO). Accredited as a Standards Development Organization (SDO) in June 1993 by the American National Standards Institute (ANSI), VSO meets every two months to address vital embedded bus and board industry standards issues. Information on ANSI/VITA standards is available on the VITA Web site.

Standards within the VSO may be initiated by a study group and developed by a working group. A study group requires only one VSO member and is used to build interest in a standard. A working group requires the support of three VITA member organizations, and the proposed work must fit within the defined scope of VITA's accreditation with ANSI.

VITA 17.2—Serial FPDP Extension

Objective: Develop a standard for 10 Gbit data transfer on Serial FPDP.

Status: The working group is holding bi-weekly teleconferences and has begun work on the initial draft.

VITA 41.0—VXS

Objective: Create a family of standards that provides a method of implementing various serial fabrics within the VMEbus framework.

Status: 41.0, 41.1 and 41.2 have completed ANSI ballots and have been recognized as American National Standards. Final published copies will be available from the VITA office shortly.

VITA 42—XMC

Objective: Extend PMC to include serial fabrics.

Status: 42.0 is now in trial use through March 2007. 42.1 and 42.2 have been recognized by ANSI. The working group has voted to send 42.3 to the ANSI process.

VITA 46—VPX

Objective: Develop a 3U/6U 160 mm deep Eurocard module with a high-performance connector capable of supporting both parallel and serial fabrics.

Status: VITA 46.0 and 46.1 have been moved into the ANSI process. Balloters are being solicited and balloting and public review will begin shortly.

VITA 48—ERDI

Objective: Define a general mechanical design implementation for circuit card assemblies that will enhance both their thermal performance and structural integrity.

Status: The working group has held several ballots. The drafts will be moved to the ANSI process soon.

VITA 49—Digital IF

Objective: Develop a new interconnect standard for passing a radio's digitized IF data between computer boards.

Status: The working group continues to discuss how best to optimize the protocol.

VITA 50—Best Practices for Electronic Module Cooling

Objective: Develop a best practices guide for electronic module cooling.

Status: Rex Harvey has put together a draft document and has asked the working group to review it.

VITA 51 – Reliability Prediction

Objective: Develop a better method for predicting electronic module reliability.

Status: The working group has set up four subgroups and usually meets at every other VSO meeting to resolve issues.

VITA 52—Lead-Free Practices

Objective: Determine how to meet current and impending lead-free regulatory requirements.

Status: This working group has been reviewing proposed standards created by LEAP (Lead-free Electronics in Aerospace Products).

VITA 55—Aurora

Objective: Develop a standard for Aurora implementations in VME standards.

Status: The group has been having weekly telecons and is working on pin assignment specifications for VITA 41 and VITA 42.

VITA 56—EPMC

Objective: Develop a standard ruggedized mezzanine formfactor that will fit on 6U cards and be front insertable/removable.

Status: The working group is studying methods to mount the mezzanine card to meet shock and vibration requirements.

VITA 57—FPGA I/O

Objective: Develop a standard for FPGA I/O on mezzanine modules.

Status: The working group has had several meetings and is further refining their scope.

VITA 58—Electronic Module Integration

Objective: Develop an enclosed form-factor standard for ruggedized electronic modules.

Status: This effort came about as a result of work done by Dennis Carlson and presented at the January VSO Meeting. The basic concept is to define an enclosure standard for electronic modules. The effort has just started and the working group is working on the scope of the standard. ▮▮

VITA
Fountain Hills, AZ.
(480) 837-7486.
[www.vita.com].

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The Teledyne Controls Wireless GroundLink (WQAR)

Enables aircraft operators to fully automate flight data recording/transmission.

A significant element in safety management and aircraft maintenance programs, Teledyne Controls' Wireless Groundlink is designed to provide aircraft operators with an immediate, reliable and cost-effective solution for data recording and transmission. Offering unprecedented reliability, the GroundLink system is designed to record and wirelessly transfer flight data from the aircraft to the ground, without any media handling and human interventions. The raw data recorded during the flight is compressed, encrypted and then transmitted via cellular technology and the Internet to the airline's or Teledyne's ground-based data center for processing and analysis. Using the Teledyne Wireless GroundLink system, the airlines can reduce data delivery delays (the data is available within 10-15 minutes after an aircraft has landed, versus several days or weeks with manual data retrieval), cut human and equipment costs associated with manual data retrieval, and eliminate data loss that can reach 30% with conventional manual methods.

ReVision by Teledyne Controls

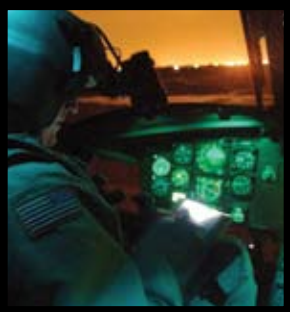
Because better pilot training means safer and more economical flight operations

ReVision is a PC-based flight crew training tool that promotes improved pilot decision-making and facilitates threat and error management training. Easily incorporated into a flight simulator and training curriculum, ReVision is a comprehensive "off-line" flight crew brief and debrief tool. The system also enables airlines and flight crew training communities to make their own tailored pilot training videos and is specifically aimed at improving training quality in multilingual environments.

ReVisionis the most widely used brief/debrief system in the industry.







"WHAT WAS I THINKING UP THERE?"

WHEN THE GOAL IS TO IMPROVE COMPLEX FLIGHT DECK MANAGEMENT AND DECISION MAKING SKILLS, THE SIMULATOR AND AIRCRAFT FLIGHT DECK DO NOT PROVIDE THE TIME OR THE PLACE TO PAUSE, REFLECT AND STUDY.

ReVision is a PC based flight crew training tool that promotes the development of pilot decision behavior learning and facilitates threat and error management training. Easily incorporated into a flight simulator and training curriculum, ReVision offers advanced "off-line" flight crew brief, debrief and mission review capability. The system also improves SOP learning and enables training communities to make their own tailored pilot training videos. ReVision is specifically aimed at improving training quality in multilingual environments and is the most widely used debrief system in the industry, for both Civil and Military applications.

REVISION FLIGHT CREW TRAINING **VISION** FLIGHT DATA ANIMATION

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Multi-Function VME Card Is Gbit Ethernet-Capable

Military programs, including airborne, shipboard, ground mobile and C3I applications, are hungry for interchangeable modules that increase functional density and reduce power consumption, size, and cost of the overall system. A perfect example along those lines is North Atlantic Industries' 6-module, multi-function, single slot VME card. This universal and highly flexible card eliminates the complexity and size constraints of using multiple, independent, single-function cards.

The 64C2 VME card can accommodate six independent modules, each of which can include the functions of A/D (10-channels), D/A (10-channels), S/D (4-channels), Function Generator (4-channels), Discrete I/O (16-channels), TTL I/O (16-channels), Transceiver I/O (11-channels), LVDT/RVDT (4-channels) and RTD (6-channels). The 64C2 incorporates a Gigabit Ethernet interface that can be used to transfer data to and from the board, without using the VME backplane bus. This Ethernet port allows the board to be used as a stand-alone remote sensor interface, without the need for a separate computer board. Multiple 64C2 boards can be distributed in a system and networked together using Ethernet for complete data acquisition capability. The 64C2 is available with operating temperature ranges of -40° to +85°C and 0° to +70°C. Conduction-cooled versions with wedgelocks are also available. Pricing is contingent upon the type of modules selected.

North Atlantic Industries, Bohemia, NY. (631) 567-1100. [www.naii.com].

Function/Arbitrary Waveform Generator is LXI-Certified

LXI's compact, flexible package, high-speed I/O and prolific use of LAN meet the needs of aerospace defense engineers developing radar, electronic warfare, satellite and military communications systems. Agilent Technologies has introduced the first LXI-certified 20 MHz function/arbitrary waveform generator with variable-edge pulses and pulse-width modulation. This adds to Agilent's list of 47 LXI-certified products, including the 34980A switch measurement unit, L4400 LXI switch modules, 34410A/34411A digital multimeters, N8200 synthetic instrument family, N6700B Series low-profile modular power system and N5700 Series system DC power supplies.

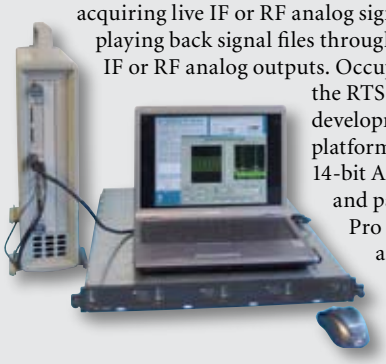
The 33220A function generator offers 11 standard waveforms plus pulse and arbitrary waveforms. The Agilent Technologies 33220A Function/Arbitrary Waveform Generator uses direct digital synthesis (DDS) techniques to create a stable, accurate output signal for clean, low-distortion sine waves. It also gives you square waves with fast rise and fall times up to 20 MHz and linear ramp waves up to 200 kHz. The 33220A can generate variable-edge-time pulses up to 5 MHz. With variable period, pulse width and amplitude, the 33220A is ideally suited to a wide variety of applications requiring a flexible pulse signal. Pricing for the 33220A Function/Arbitrary Waveform Generator Active product is from $1,853.

Agilent Technologies, Palo Alto, CA. (650) 752-5000. [www.agilent.com].

Platform Offers Real-Time Multiband Recording/Playback Solution

For high-bandwidth data recording and playback applications such as radar, direction finding, SIGINT and telemetry, a mix of FPGA flexibility and real-time performance ranks at the top of designers' priorities. Pentek feeds that need in its latest member of its RTS family of real-time data recording and playback platforms, the RTS 2504. The RTS platforms are complete, fully integrated instruments featuring a range of A/D and D/A resources with high-speed links to cost-effective JBOD disk arrays.

The RTS 2504 uses Pentek's 7140 PMC radio transceiver module for acquiring live IF or RF analog signals for disk storage, and playing back signal files through D/A converters to deliver IF or RF analog outputs. Occupying a single VMEbus slot, the RTS 2504 is a fully programmable development platform. The RTS 2504 platform accepts signals through two 14-bit A/Ds sampling at up to 105 MHz and passes the signals to a Virtex-II Pro FPGA for signal processing and data handling. The FPGA works in conjunction with a 4-channel Graychip/TI GC4016 digital receiver to extract and tune narrowband channels with bandwidths ranging from audio up to 2.5 MHz. The RTS 2504 data recording and playback platform hardware is priced starting at $26,995, available Q3 2006.



Pentek, Upper Saddle River, NJ. (201) 818-5900. [www.pentek.com].

Starter Kit Targets RapidIO-Based VXS

Switched Fabrics were no overnight success among military system designers. It took years for them to warm to the idea. And even though RapidIO and VXS have achieved acceptance, users still need help to get started. With that in mind, Mercury Computer Systems has announced a family of starter kits, with the first in the series based on its PowerStream 6100 series RapidIO VXS multicomputer.

The PowerStream 6100 VXS Starter Kit provides developers with the basic hardware and software building blocks to develop embedded, high-performance sensor applications for military and commercial environments. The Starter Kit includes the PowerStream 6100 VXS chassis, up to three quad 1 GHz PowerPC 7448 processor-based high-compute density (HCD) boards, two serial RapidIO switch cards, a host/PMC carrier, a 12-channel digital receiver, and a software bundle that includes the complete Mercury MCOE software environment.

At 761 GFLOPS and 42 Gbytes/s sustained fabric throughput, the PowerStream 6100 lays claim as the first and only multicomputer solution based on the Serial RapidIO fabric and compliant with the VXS (VITA 41.2) form-factor standard. The PowerStream 6100 VXS Starter Kit is available today with standard lead times. Pricing starts at $99,000 in a base configuration.

Mercury Computer Systems, Chelmsford, MA. (978) 256-0052. [www.mc.com].

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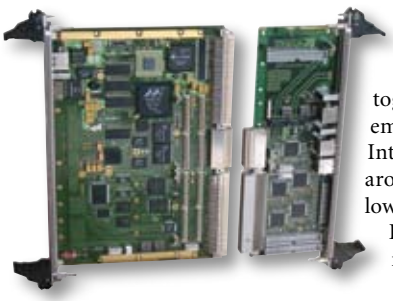


1.7 GHz PowerPC Rides on VME64x/ 2eSST SBC

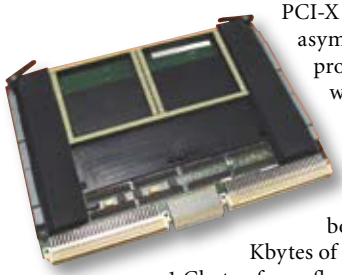
VME and the PowerPC processor architecture together form the heart of today's installed base of military embedded computer systems. Supporting that tradition, Interface Concept has rolled out a new VME SBC based around the Freescale 1.7 GHz MPC7448 PowerPC. This low-power PowerPC design provides 1 Gbyte of SDRAM-DDR with ECC. Both fast NOR and large NAND flash memories are implemented onboard.

The IC-e6-VMEa runs as a system controller or a standard single-slot board. An automatic detection can be used with the VME64x backplane. The VMEbus interface is based on a combination of the Tundra Tsi148 VME bridge and the latest generation of Texas Instrument transceivers. The 2eSST bus protocol capabilities provide up to 300 Mbyte/s transfer rates across the VMEbus. The board supports three Gbit Ethernet channels, one console port and one USB 2.0 controller. A quad UART provides four additional asynchronous channels available on P2 connector. The 64-bit PCI/PCI-X bridge allows the VME SBC to control two PMC mezzanine boards with the PnIO routed according to the VITA 35. Thanks to its SATA controller, the IC-e6-VMEa can manage directly four storage devices. The IC-e6-VMEa board can operate from -40° to 75°C. The conduction-cooled version runs at 1.4 GHz. Prices start at $4,800.

Interface Concept, Briec de l'Odet, France. +33 (0)2 98 57 30 30. [www.interfaceconcept.com].

VME SBC Boasts Distributed Dual-Processing Scheme

This year is shaping up to be the year of dual-processing. Processor and board vendors alike are in the thick of the trend toward maximizing the effectiveness of multiple CPUs in a system. Offering a unique approach to dual-processing, Aitech Defense Systems offers a rugged 6U VME single-slot SBC that maximizes functionality and power by incorporating dual processors that operate independently of one another, yet communicate over a high-speed PCI-X interconnecting bus. The new C102's processors use an asymmetrical distributed architecture, so that each of the processing nodes functions as a complete subsystem complete with local memory resources and basic I/O interfaces, eliminating data flow bottlenecks.



The C102 incorporates one or two high-performance PowerPC G4+ MPC7448 processors operating at 1.42 GHz that feature on-chip 32 Kbyte L1 and 1 Mbyte L2 caches. The board provides up to 2 Gbytes of DDR SDRAM with ECC, 256 Kbytes of NVRAM, up to 256 Mbytes of Boot Flash memory and up to 1 Gbyte of user flash memory (512 Mbytes per processor node), as well as up to 16 Gbytes of NAND onboard flash file memory for mass storage. The C102 is available in both conduction- and air-cooled models, per IEEE 1101.2 and ANSI/VITA 1-1994 specifications, respectively. Pricing for the C102 starts at $6,750.

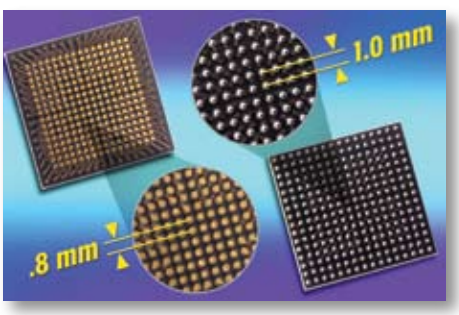
Aitech Defense Systems, Chatsworth, CA. (888) 248-3248. [www.rugged.com].

Embedded Server Supports PC/104 Expansion

The drawback to a complete all-in-one system has always been the lack of flexibility to customize to application requirements. Octagon Systems nullifies that drawback by offering an approach that marries the complete system approach with the ability to mix and match I/O and other functions via PC/104 add-in cards. Taking just that approach is XMB Mobile Server, the latest member of the company's I-CORE line of rugged computers with expandable I/O and fanless operation. The basic unit includes the processing power, power supply, memory and I/O for most applications.

Standard I/O includes dual Ethernet, quad USB 2.0, dual serial, CRT and LCD video and digital I/O. Because the XMB-1 is fully functional out-of-the-box, additional I/O such as GPS, analog, GPRS and video camera can be readily added via PC/104, PC/104-Plus and XBLOK modules. An option panel can be easily removed and punched for custom annunciators, connectors and controls. Generated heat is efficiently channeled directly to the case to help prevent internal hot spots. The XMB Mobile Server operates in ambient temperatures from -40° to 75°C, depending upon the processor speed, user options and mass storage devices. The single-piece price is $2,475 with volume discounts.

Octagon Systems, Westminster, CO. (303) 430-1500. [www.octagonsystems.com].



256-Ball BGA Adapter Converts 0.8 mm to 1.0 mm Pitch

The long design cycles of military systems inevitably span across a generation or two of IC packaging pitches. By using an adapter, system designers can use newer packages with tighter pitch without redesigning boards crafted to support older pitch schemes. Along those lines, Aries Electronics has introduced a new Correct-A-Chip Ball Grid Array (BGA) adapter that allows 0.8 mm pitch devices to be mounted to PCBs laid out for 1.0 mm pitch devices, eliminating the need for new or reworked PCBs. The bottom of the new adapter mounts on a PCB with a BGA pad footprint on 1.0 mm pitch, while the top of the adapter accepts BGA devices with 0.8 mm pitch.

The new 16 x 16 array (256)-ball BGA adapter measures 0.650 inches square and is constructed of 0.040 FR-4 material with 0.020-inch diameter solder balls of tin/lead 63/37. PCB plating is ENIG (immersion gold over electroless nickel) 3-8 micro-inches gold per IPC-4552 over 100 micro-inches minimum nickel, per ASTM-B-733. In addition to these standard materials, Aries can furnish the new adapter using special materials, platings, sizes and configurations to meet specific customer needs. Pricing for the new Correct-A-Chip adapter (Aries number 256-301750-18) starts at $110 each in single-piece quantities.

Aries Electronics, Frenchtown, NJ. (908) 996-6841. [www.arieselec.com].

Pioneer Magnetics

1745 Berkeley Street
Santa Monica, CA 90404
www.pioneermagnetics.com

P: (800) 269-6426
F: (310) 453-3929
sales@pioneermagnetics.com

The Ultimate 1U Power Supply
1U x 19" x 20"—Max Power 10kW

Max Power 10kW 1U Power Supply

Pioneer introduces the ULTIMATE 1U power supply with unmatched 3.3kW of continuous and reliable power. Built with a Hot Plug I/O connector, this low profile power house provides 10kW of system power or 6.6kW of N+1 redundant power in a 1U, 19" Power Shelf.

Two or three 1U x 19" stacked shelves with six or nine modules will be capable of providing 20kW or 30kW of system power or 16.5kW or 26.4kW of N+1 redundant power.

A single 3U, 19" shelve with ten modules arranged vertically can provide 33kW of system power or 29.7kW of N+1 redundant power.

The design allows easy expandability to higher power systems using unlimited 1U power shelves.

The 1U power supply is also available with built in intelligence. IPS(tm), the Intelligent Power Supply Module, can communicate via RS232, RS485, I2C and/or a PCM that allows local walk up control and internet access to the power system.

A single unit continuously provides full output power over operating temperatures of 0°C to +40°C from a single phase AC input line ranging from 90 to 264VAC.

150A 5" x 5" 8.1kW
High Power Density Rectifier

8.1kW Rectifier with Industry Leading 21W/cubic inch Power Density

Pioneer introduces The Ultimate in Power Technology, the power factor corrected 8.1kW Rectifier. Keeping PMI's traditional 5" x 5" package, this super high power density rectifier is designed for supporting standalone or N+1 redundant power applications.

Operating at up to 92% efficiency at 240VAC, it is built with premium quality components for high performance, ruggedness and reliability.

A standard 3U, 23" Power shelf can provide up to 32.4kW of system power or 24.3kW of redundant power.

The unit features forced internal air cooling with built-in protection from electrical overloads.

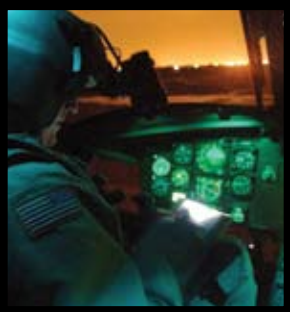
With 3P AC Input 180 to 264VAC, a single rectifier provides continuous full output power for operating temperatures from 0°C to +50°C.

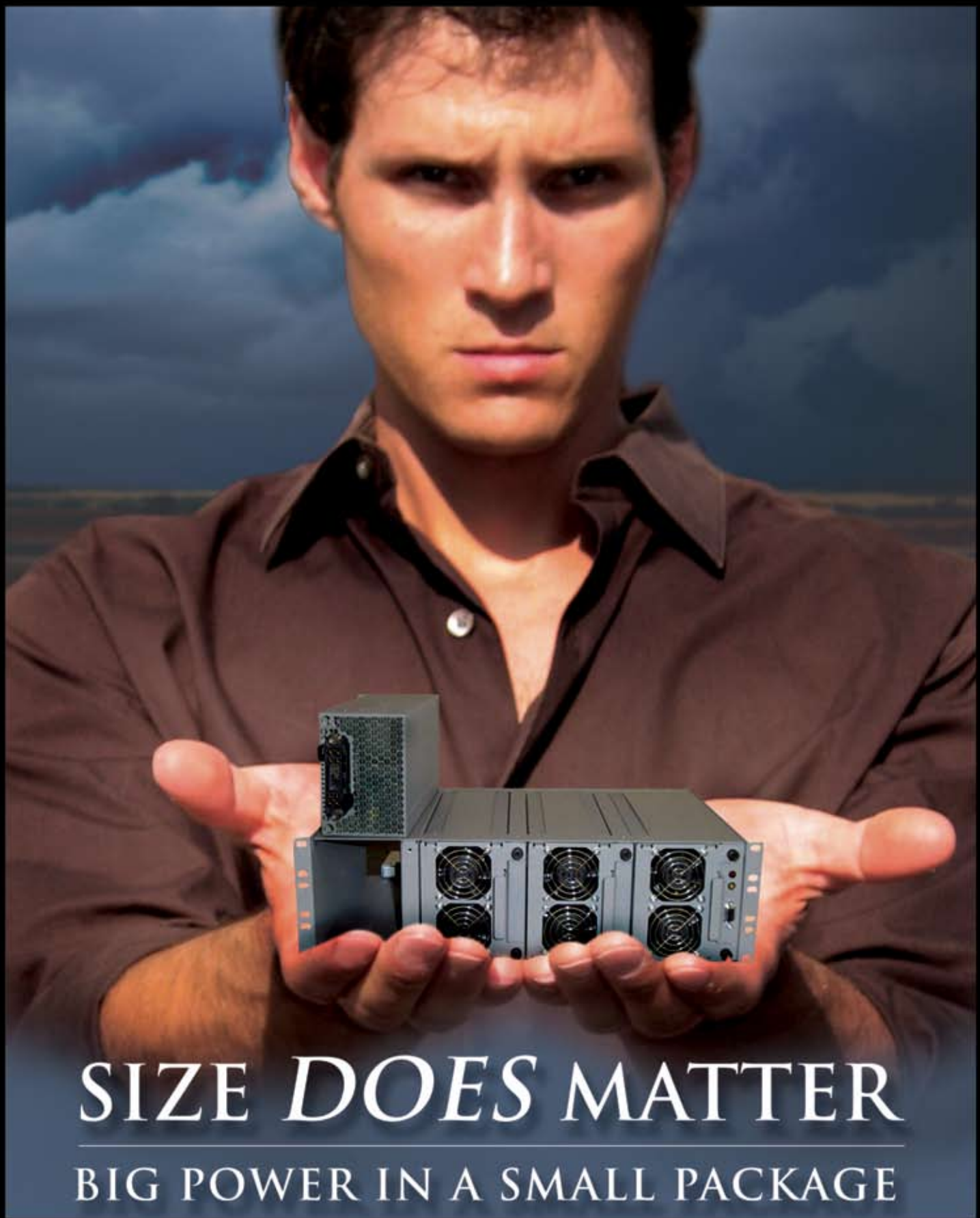
The 8.1kW Rectifier has available outputs of 54VDC @ 150A. It features Power Factor Correction, 0°C to +50°C at Full Load, Standard 5" x 5" x 15.5" or 17" Case for hot plug, Output Fully Floating, Over Current Protection, Over Voltage Protection, Remote Sense, Over Temperature Protection and Self-Contained Forced Air Cooling.

The unit is designed to meet UL, CSA, TUV to EN60950, Conducted & Radiated EN55022 Level A and EN50082-1.









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Fanless SBC Sports Geode LX800 CPU

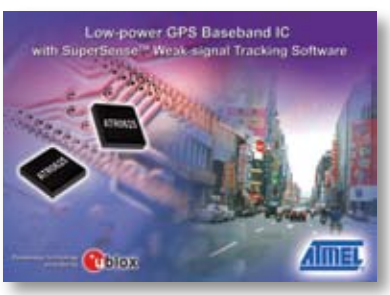
Fans are generally frowned upon in military systems, particularly in vehicles. A fan represents a single point of failure that's too unreliable for rugged systems. Serving such needs, Nexcom's NICE 3120 is based on the low-power AMD Geode LX800 processor and CS5536 chipset with 400 MHz FSB. The board houses all of its electronics in a 195 x 150 x 80 mm (7.68 x 5.91 x 3.15 in.) heavy-duty aluminum chassis, and boasts a myriad of I/O ports located at both the front and the back of the unit.

These include two 10/100 Ethernet LAN ports, four USB 2.0 ports, IEEE1394, VGA and Audio-out. For added flexibility, the NICE 3120 also boasts four RS-232 ports, a CompactFlash socket, PC/104-Plus and one Mini-PCI expansion slot for wireless connection solutions. The NICE 3120 supports a 184-pin non-ECC, non-registered DDR DIMM, with up to 1 Gbyte and has one 2.5-in. HDD drive bay. Rounding out the features are programmable alarm and status LEDs, PS/2 keyboard/mouse port and DC power +12 V input. Single-unit pricing for NICE 3120 starts at $410.

Nexcom, Newport Pagnell, UK. +44 (0) 1908 218877. [www.nexcomuk.co.uk].

GPS Baseband IC Embeds Signal Tracking Code

GPS has become an indispensable tool for Warfighters. Now the technology can be embedded in very small low-power devices.



Exemplyfying that trend, Atmel and U-blox have teamed to offer the ATR0625, a baseband IC with SuperSense GPS weak-signal tracking software included in its ROM. ATR0625 is based on the ANTARIS 4 platform, which is a low-power, 16-channel GPS technology.

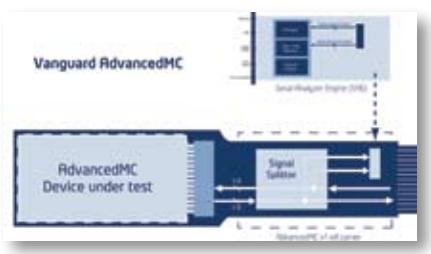
Thanks to the integration of the well-proven SuperSense software on masked ROM, an external flash memory becomes unnecessary. SuperSense uses a combination of coherent and incoherent tracking combined with variable integration times for the individual satellites. A leading-edge tracking sensitivity of -158 dBm is achieved with a power consumption that remains low at a low signal level. The ATR0625 is packaged in a low-cost QFN56 package and is pin-compatible with the ATR0622 ANTARIS 4 baseband IC with standard ROM software. This makes it easy for customers to enable their existing products with weak-signal tracking technology. Like all ANTARIS 4 chipsets, the ATR0625 comes with full WAAS/EGNOS support and incorporates state-of-the-art Assisted GPS (A-GPS) with a TTFF as low as four seconds. ATR0625 samples in 8 x 8 mm 56-pin QFN packages are available now.

Atmel, San Jose, CA. (408) 441-0311. [www.atmel.com].

U-blox, Thalwil, Switzerland. +41 (44) 722 74 44. [www.u-blox.com].

PCI Express Analyzer Targets AMC Form-Factor

Driven by its compact size, the AdvancedMC (AMC) form-factor is gaining the attention of the military market. Supporting that AMC trend, VMETRO has added the Vanguard Express PCI Express Protocol and Link Analyzer for the AdvancedMC (AMC) form-factor to its line of analyzer products. Designed for debugging, testing and validating the PCI Express protocol, the Vanguard Express AdvancedMC allows testing of AMC.1 type 1, 2, 4 and 8 modules. The Vanguard Express AdvancedMC is a self-contained unit that installs between the device under test and the host system, and allows testing with minimal intrusion to the system under test.



A single workstation can control multiple Vanguard analyzers for monitoring different protocols and form factors including PCI Express, PCI-X/PCI, PMC, CompactPCI or VME. At the heart of the Vanguard Express AMC is VMETRO's Serial Analyzer Engine module (SAE). The SAE can be used on various VMETRO adapters providing PCI Express Analysis in multiple form factors. The system provides independent and concurrent operation of the analyzer, statistics and protocol checker. USB and Ethernet communications are supported. The unit has a 256 Mbyte trace buffer and supports eight trigger events. The Vanguard Express AdvancedMC products are available now and pricing starts at $23,950.

VMETRO, Houston, TX. (281) 584-0728. [www.vmetro.com]

TFT LCD Controller Is Customizable

As the military moves toward networking all of its systems together, up goes the demand for displays to present that networked information. Often that calls for a custom flat-panel monitor solution. Feeding that need is the new SP-1600 controller from Digital View. The first in Digital View's new Professional Class series, the SP-1600 is a fully buffered, multi-sync interface controller that provides direct analog and digital connection—PC, DVI and Video interface—to a wide range of TFT LCD panels up to UXGA resolution (1600 x 1200 pixels).

The product includes a Panel Development Kit that lets users customize the output timing of the controller board to match a particular LCD, enabling advanced monitor manufacturers to quickly adapt to support the newest LCD panel releases. The SP-1600 provides full connectivity to TFT LCDs with resolutions from VGA through UXGA inclusive of 4:3 16:9 and 16:10 aspect ratio panels. Features include up to 8-bit-per-color (16.7 million colors), OSD menu, function controls, image scaling, image control and Auto picture setup, color gain and power. The board measures 179 x 120.4 mm (7 x 4.74 in.) with DV standard form-factor and mounting holes. It offers an MTBF in excess of 100,000 hours. The SP-1600 is priced at $200 (1,000s).

Digital View, Morgan Hill, CA. (408) 782-7773. [www.digitalview.com].

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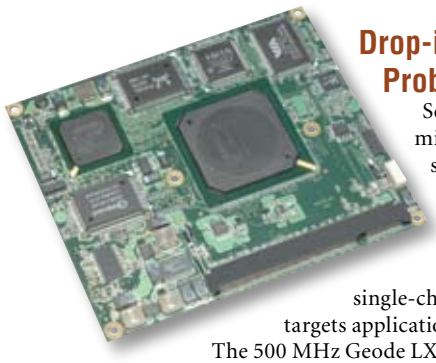


Drop-in ETX Replacement Module Solves EOL Problems

Several non-RoHS ETX modules used in a wide range of military applications recently reached end-of-life (EOL) status, which has left stranded developers of systems based on these boards. To help keep OEMs in production, Ampro Computers has introduced an ETX module that drops into existing baseboard designs.

Utilizing the new RoHS-compliant AMD Geode LX 800 single-chip integrated processor and Northbridge, the ETX 610 targets applications ranging from building automation to voting machines. The 500 MHz Geode LX 800 is integrated with 2D graphics, a memory controller and a PCI bridge. To facilitate fanless system designs, the CPU has a low thermal design power (TDP) rating of 3.9W. The module also contains DDR SODIMM RAM to 1 Gbyte, as well as USB 2.0 ports, EIDE and Serial ATA (SATA) interfaces for migration, 10/100 Mbit Ethernet, ACPI power management, PCI expansion and ISA bus expansion for custom circuitry on the ETX baseboard. LVDS flat panel LCDs are supported.

ETX 610 QuickStart Kits include drivers and BSPs for Windows XP, Windows XP Embedded and Windows CE 5.0, as well as a full Linux 2.6 distribution (Fedora Core 3). Modules will begin shipping by late May. Pricing for production volumes is in the low $200s.

Ampro Computers, San Jose, CA. (408) 360-0200. [www.ampro.com].

High-Speed A/D I/O Card Offers Four 105 MHz Channels

Getting analog signals into the signal processing environment for applications like sonar and radar can be a big challenge. A new high-speed analog-to-digital I/O board from BittWare provides a multi-channel approach, with four channels of 105 MHz A/D conversion and a reconfigurable FPGA.

The Tetra-PMC+ A/D I/O card features four high-performance, 14-bit wideband A/D converters running at up to 105 MHz. These stream data directly to an Altera Cyclone II FPGA for A/D control, distribution of converted data and front-end processing. Data pre-processing functions can be configured to enable digital filtering, decimation and digital down conversion. Data can be transferred to the baseboard over the PMC interface by the Cyclone II.

In addition to complete software development tools that allow designers to easily develop application code and integrate the Tetra-PMC+ into their systems, BittWare offers a Tetra developer's kit for the Cyclone II that includes source for the A/D converters and the link ports. The Tetra-PMC+ will be available in Q2 of 2006 at a list price of $3,995.

BittWare, Concord, NH. (603) 226-0404. [www.bittware.com].

Small, Low-Power Controller Board Has CAN

The controller area network (CAN) interface is widely used in the backbone networks of flight state sensors and navigation systems. In such systems where there's a large amount of I/O in tight, remote spaces it can be difficult to add functionality or turn a specific function on or off without having to reprogram the entire system. A RoHS-compliant board from Micro/sys allows exactly that.

The MCB58, a new member of the Micro/sys SNAP series of microcontroller boards, is based on the Freescale HC(S)08 MCU. Measuring 3.55 in. by 2.65 in. by 0.5 in., the MCB58 typically draws a low 300 mW while running at its fastest speeds and executes with a 50-nanosecond instruction time. The board's wide assortment of I/O includes a PC/104 slot, an RS-485 serial port, four isolated digital outputs, four isolated digital inputs and 24 additional lines of TTL-level digital I/O. Filters allow four channels of PWM to act as four independent D/A converters. Also included are an onboard temperature detector, a real-time clock, a CAN interface and a 16k serial EEPROM.

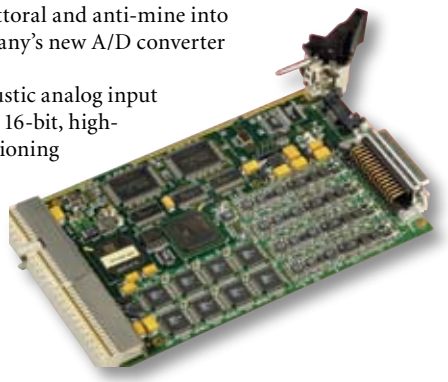
The board contains 60 Kbytes of program/data flash and 4 Kbytes of SRAM. Metrowerks' CodeWarrior compiler is included in the SDK. Single quantity pricing is $95.

Micro/sys, Montrose, CA. (818) 244-4600. [www.embeddedsys.com].

3U CompactPCI A/D Board Targets Sonar Analysis Apps

Squeezing the high-speed acoustic technology used for military sonar analysis applications such as littoral and anti-mine into a 3U CompactPCI form-factor is no mean feat. But it's been done by ICS Sensor Processing in the company's new A/D converter board to achieve substantial reductions in size and weight.

The ICS-1745 high-speed acoustic A/D converter board features eight channels of high-frequency acoustic analog input and onboard signal conditioning with programmable gain. All channels use the Analog Devices AD9260 16-bit, high-speed oversampled A/D converter with buffer memory to deliver 2.5 Msamples/s. Onboard signal conditioning eliminates the requirement for external signal conditioning logic. With a maximum bandwidth of 1.25 MHz, the ICS-1745 supports four input voltage ranges (20 Vpp, 2 Vpp, 0.2 Vpp and 0.02 Vpp differential) and 8 Mbytes of memory in two banks.



The anti-alias cut-off filter frequency is fixed at 1.25 MHz standard, and other frequencies can be supplied on request. Differential analog input is provided via the front panel, while a second front-panel connector makes possible multiple board synchronization for systems requiring high channel counts. Windows and Linux drivers are available. Price is $6,235 in OEM quantities.

Radstone Embedded Computing, Billerica, MA. 1-800-368-2738. [www.radstone.com].

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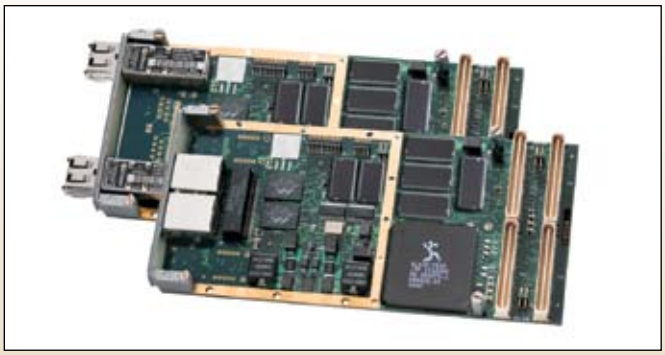


Model # ET-71000

Data Device Corporation's (DDC) ET-71000 series are dual channel Gigabit Ethernet (GigE) PMC cards optimized for use in embedded avionics and vetronics systems. These include sensor interfacing, multi-processor and DSP arrays, radar systems, display systems, serial backplanes, and storage. The cards include a TCP/IP Off-load Engine (TOE) that implements the full TCP/IP protocol stack, thus freeing up valuable host processor bandwidth.

The card's architecture provides the flexibility to meet the system requirements for embedded, real time, military applications. The flexible architecture is not sensitive to rapidly changing commercial market forces that can result in shortened life cycles. Instead, DDC Gigabit Ethernet technology has been designed to meet the multi-decade life cycle demands of military/aerospace programs, continuing our demonstrated commitment as a long-term military COTS supplier of digital interface devices.

DDC firmware technology for the TCP/IP protocol engine, data traffic manager, and redundancy manager provides deterministic performance and reliability. The ET-71000 supports high-speed duplex data transfer while preserving a standard BSD Sockets interface, allowing transparent support for network applications. The card is available in versions providing either electrical or optical interfaces on a conduction-cooled PMC form factor.

USB 1553/429 Avionics Interface

Model # BU-65590UX

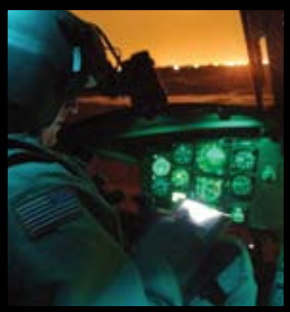
Small, lightweight, and rugged, DDC's BU-65590U's USB 2.0 Interface provides two dual-redundant 1553 channels, four ARINC 429 receive channels, two ARINC 429 transmit channels, Eight User-programmable Digital Discrete I/Os, and an IRIG-B time synchronization input. Accepting power directly from the computer's USB port or (optional) external source, the BU-65590UX is a portable solution suitable for use with virtually any laptop, desktop, or tablet computer.

The 1553's Extended Enhanced Mini-ACE (E2MA) Architecture interface continues DDC's tradition of field-proven, industry standard EMA Architecture. While maintaining full legacy compatibility, E2MA supports new standard features for each 1553 channel such as 1 MB RAM with parity, 48-bit / 1 micro-second time tag synchronized to an IRIG-B input, and built-in self test. Each 1553 channel can emulate a Bus Controller, Remote Terminal, or Bus Monitor. The device includes a combined RT/Monitor mode for surveillance of all 1553 communications on the bus, including its own RT address.

Included are High Level C API (Application Programming Interface) Library Software supporting all advanced architectural features, driver support for Windows® 2000/XP for MIL-STD 1553 and ARINC 429 functionality, and compatibility with DDC's dataMARS advanced monitoring software. Sophisticated yet user-friendly library functions abstract all register accesses and memory allocation.







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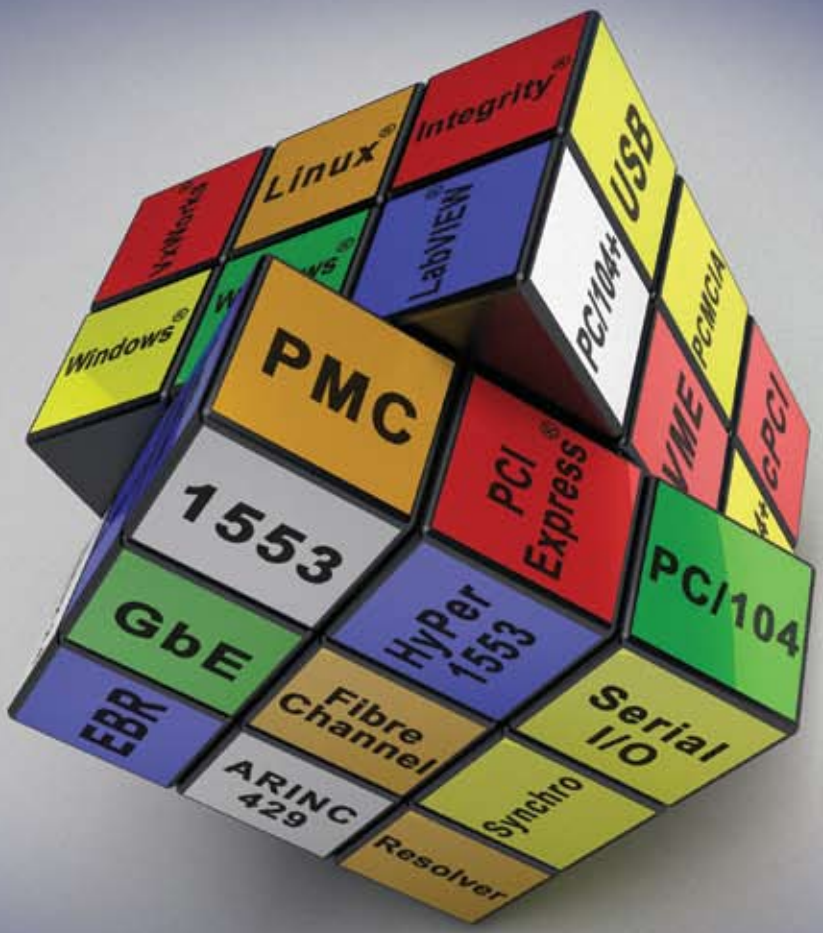

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SBC for Mobile Apps Has 5 Low-Power Modes

Designers of mobile high-performance systems, such as handheld and wearable military electronics or small UAVs, need a way to fine-tune power consumption. The new BitsyXb SBC from Applied Data Systems features five low-power modes to help make the SBC power-stingy, as well as dynamic variable speed and voltage regulation.

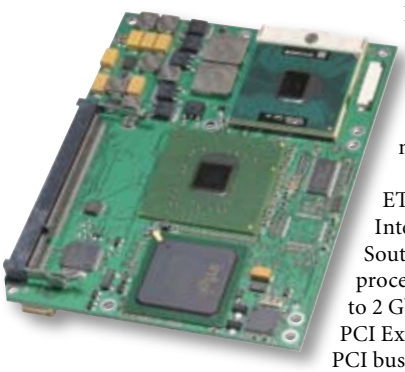
The compact, 3 in. x 5 in. BitsyXb is based on Intel's 32-bit, 520 MHz XScale PXA270 CPU, with a video interface up to XGA resolution. Up to 128 Mbytes of SDRAM program memory and up to 64 Mbytes of flash memory are provided. 128 Kbytes of EPROM is included as a boot device. For expansion and connectivity, the board has a PCMCIA Type II interface, three serial ports, a USB port, an Intel QuickCapture camera sensor input bus, 10 digital I/Os, an SPI port, an I²C bus and ADSmartIO with nine configurable inputs/outputs.

An onboard power supply has input voltage of 5V or 6-16V. The board consumes less then 1W during operation, and is ruggedized at -45° to +85°C. Windows CE .NET and Linux are supported. The BitsyXb SBC is priced in the $300s.

Applied Data Systems, Columbia, MD. (301) 490-4007. [www.applieddata.net].

ETX COM Express Module Aims at High-Performance Apps

The new PICMG COM Express standard for computer-on-module (COM) form-factors promises higher performance and I/O bandwidth in a much smaller space, something that designers of small but powerful military systems will appreciate. A new COM from Kontron, the ETXexpress-CD, leverages the Intel Core Duo processor to provide extremely high performance for the COM Express Basic Form Factor modules.



The 95 mm x 125 mm ETXexpress-CD includes the Mobile Intel 945GM chipset and the ICH7M Southbridge to deliver up to 2x 2 GHz processor performance. It supports up to 2 Gbytes of DDR2-SDRAM. Up to five PCI Express x1 lanes and a 32-bit/33 MHz PCI bus are included, as well as a Gigabit Ethernet port, a PCI Express Graphic x16 lane, two Serial ATA and one Parallel ATA interfaces and eight USB 2.0 ports. CRT and LVDS output are provided to drive high-resolution monitors and displays.

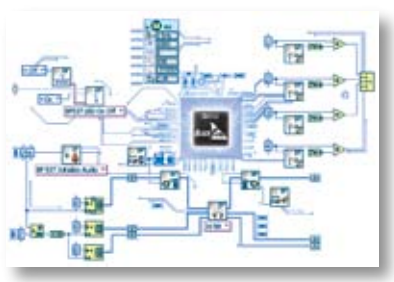
Windows XP, Windows XP Embedded, Windows 2000 and Linux are supported. The ETXexpress-CD is RoHS-compliant. Prices start at $800, depending on processor speed.

Kontron America, Poway, CA. (888) 294-4558. [www.kontron.com].

Graphical Design Platform Available for ADI's Blackfin Processor

Military engineers developing highly sophisticated and specialized applications often want to use a single graphical platform all the way from algorithm design and prototyping to deployment and test. Now they can do this for applications based on Analog Devices' Blackfin processors. National Instruments has extended the LabVIEW graphical dataflow development environment by releasing the LabVIEW Embedded Module for ADI Blackfin processors.

The software features more than 140 Blackfin-specific, hand-optimized math, analysis and signal processing functions. Integrated I/O such as audio and video D/A converters, A/D converters and codecs are provided, as well as on-chip debugging and easy graphical interconnection via Ethernet. The module includes the ADI VisualDSP++ C development and debugging environment for low-level access and real-time, interactive debugging and deployment directly to Blackfin.



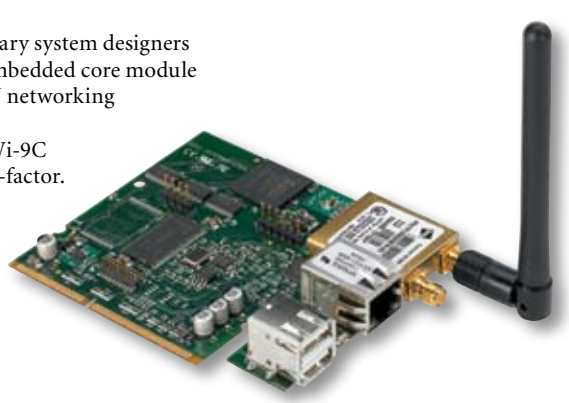
Engineers can debug code graphically in LabVIEW or simultaneously debug both the graphical code and generated C source code. The module ships with application examples such as audio, control, power monitoring and communications and provides easy connectivity to NI test and measurement hardware. Pricing starts at $6,995.

National Instruments, Austin, TX. (512) 683-0100. [www.ni.com].

Core Module Integrates Wired/Wireless Networking

As military wireless devices of all kinds are increasingly connected to wired networks, military system designers are challenged with finding a single, secure solution that works equally well for both. A new embedded core module from Digi International integrates 10/100 Mbit Ethernet with secure 802.11a/b/g wireless LAN networking capabilities.

Powered by Digi's 155 MHz ARM9-based NetSilicon NS9360 processor, the ConnectCore Wi-9C provides up to 256 Mbytes of integrated SDRAM/flash memory in a compact SO-DIMM form-factor. For I/O connectivity, the ConnectCore Wi-9C features USB, UART, I²C, SPI, PWM and GPIO interfaces. Wireless security protocols supported include WEP, WPA and WPA2/802.11i.



The ConnectCore Wi-9C is pre-certified, eliminating costly certification delays during product development. It is also RoHS-compliant. Operating temperature range is -40° to +85°C. Development kits for NET+Works, Linux and Windows CE are available. The ConnectCore Wi-9C will be available in Q3 2006 starting at $149 each in quantities of 1,000.

Digi International, Minnetonka, MN. (952) 912-3444. [www.digi.com].

USB Interface Card Takes Aim at Avionics Apps

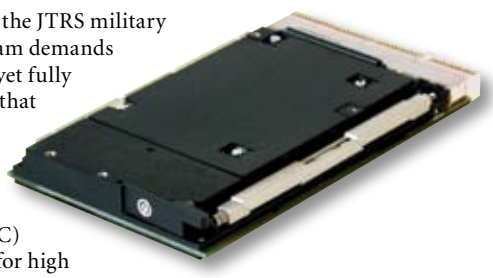
Fans of MIL-STD-1553 know that this data bus standard delivers a reliable solution for a deterministic interface control technology in military aircraft. The ARINC-429 standard is just as popular for commercial aircraft systems. New levels of performance and flexibility for systems that interface to either of these buses are available in a multi-protocol USB interface from Data Device Corp.

The BU-65590U USB 1553/429 Avionics Interface can be used with desktop, laptop or tablet computers. It features two dual-redundant 1553 channels, four ARINC-429 receive channels, two ARINC-429 transmit channels, eight user-programmable digital I/O and IRIG-B time code input. Each 1553 channel can emulate a Bus Controller, a Remote Terminal or a Bus Monitor. The card provides 1 Mbyte of RAM per 1553 channel. Each 429 channel supports maximum data throughput on all channels while providing message scheduling, label filtering and full error detection.

Options include 1553-only or 429-only versions. Included is the BU-69090S series software, which is DDC's E²MA MIL-STD-1553 C API library and drivers. Also included is the DD-42950S series software, DDC's High Level ARINC-429 C API Library. Prices start at $2,500, depending on configuration and quantities.

Data Device Corp., Bohemia, NY. (631) 567-5600. [www.ddc-web.com].

Ultra-Mobile PC Targets Net-Centric Manpack Computers



Among other things, the JTRS military communications program demands ultra-small, ultra-light yet fully functioning computers that fit into the warfighter's pant pouch. The Spartan (P630), the industry's first rugged Ultra Mobile PC (UMPC) engineered specifically for high performance, low power and small size, is now available from General Micro Systems.

The Spartan's footprint is only 6.5 in. x 3 in. x 0.5 in., including a display, a shock-mounted hard drive up to 60 Gbytes, a touchscreen and containment in a hardened, completely sealed enclosure. It provides full notebook functionality based on a 1.4 GHz Pentium M processor with up to 2 Mbytes of L2 cache. Intel's Core Duo processors are also supported. Up to 2 Gbytes of 266 MHz ECC DDR SDRAM and 16 Gbytes of boot flash are included. The Spartan features an embedded GPS receiver and an 802.11b/g Wireless Ethernet or Bluetooth port. The onboard video supports OpenGL and DirectX for video overlays and mapping/targeting functions. For further customization, I/O ports for video, USB devices and FireWire are provided.

For secure operation, CompuSec is designed in to prevent tampering with the OS and BIOS, and E-Purge allows the initiation of hard drive destruction. Windows XP Pro, Linux, QNX and VxWorks are supported. Conduction-cooled and convection-cooled versions are available. Pricing begins at $3,400 in quantities of 100 units. Delivery is 60 days ARO.

General Micro Systems, Rancho Cucamonga, CA. (800) 307-4863. [www.gms4sbc.com].

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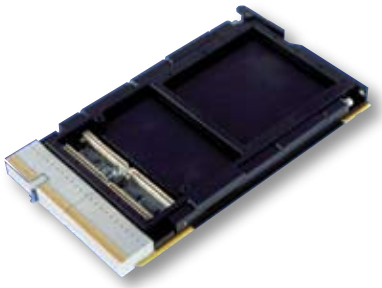


3U cPCI SBC Is First with Intel Core Duo

Intel's 1.67 GHz Core Duo processor is bringing lots of compute power muscle with ultra-low voltage operation to defense and aerospace platforms where size, weight and power are critical. An SBC from Curtiss-Wright Controls Embedded Computing is the first to incorporate this chip into a single-slot 3U CompactPCI form-factor.

The S/PCP3-1201's single- or dual-core CPU consumes only 15W, and is accompanied by 2 Mbytes of L2 Advanced Transfer Cache. Up to 1 Gbyte of ECC DDR2 SDRAM and up to 2 Gbytes of USB user flash are included, along with two Gigabit Ethernet ports, three USB 2.0 ports, six RS-232 ports, two SATA ports and eight GPIO lines. The board provides one PMC expansion site and an optional backside 1x8 PCI Express XMC site.

The S/DCP3-1201 is offered in L0, L50 and L100 air-cooled and L100 and L200 conduction-cooled ruggedized levels. The board will be available in the summer of 2006. Pricing starts at under $4,000.

Curtiss-Wright Controls Embedded Computing, Dayton, OH. (937) 252-5601. [www.cwcembedded.com]

PMC Card Targets 1553B Notice II

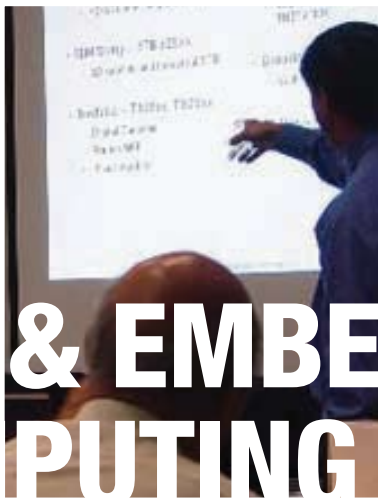
MIL-STD 1553 is still a communications bus of choice for avionics and similar applications when reliability and data accuracy are required. With that in mind, Condor Engineering has introduced the EPMC-1553, a high-density PMC card for MIL-STD-1553B Notice II.

Available in configurations with one, two, four or eight dual-redundant, fully compliant 1553B/1760 interface channels, the EPMC-1553

provides 128 Kbytes of RAM per channel, as well as eight bi-directional avionics-level discretes and eight RS-485 discretes. All of the board's channels are multifunction, and can be easily configured to operate with simultaneous Bus Controller, Remote Terminal and Bus Monitor functionality.

Options include an IRIG-B receiver/generator. Included with the EPMC-1553 is CORE-API, a flexible, east-to-port API provided in source code. Board support packages for VxWorks and Windows XP, 2000, Me, NT, 98 and 95 are provided. The EPMC-1553 PMC card is priced starting at $4,990.

Condor Engineering, Part of GE Fanuc Embedded Systems, Santa Barbara, CA. (805) 965-8000. [www.condoreng.com].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3U CompactPCI Express Dual Gigabit Ethernet Board

MAX Express™ CompactPCI Express Dual Gigabit Ethernet Board

The MAX Express dual Gigabit Ethernet board is a 3U CompactPCI Express (CPCIe) controller board featuring the Intel 82571EB Gigabit Ethernet controller. The Type 2 form factor board provides a PCI Express x4 connection to the backplane with two 1Gb/sec RJ-45 ports on the front panel. The ports allow Ethernet interfaces for 1000BASE-T, 100BASE-TX, and 10BASE-T. The MAX Express CPCIe dual Gigabit Ethernet board features hot swap functionality and offers a 3U or 6U faceplate option.

The MAX Express Ethernet board is the first CompactPCI Express add-in board of its type for the industrial computing marketplace. The board can be installed in a type 1 or type 2 slot and features a native PCIExpress (PCIe) x4-to-Ethernet controller, providing 10GBs/sec throughput without the necessity of an external bridge, thus reducing latency and increasing throughput. The Intel® 82571EB controller offers two fully integrated Gigabit Ethernet media access control (MAC) and physical layer (PHY) ports. Additionally, the controller ensures less latency and a 10GBs/sec data throughput. This board offers designers a huge step-up in designing and testing their own CompactPCI Express systems and components. One Stop Systems offers a full line of PCI Express and CompactPCI Express components and systems

One Stop Systems' MAX Express™ Expansion Kits

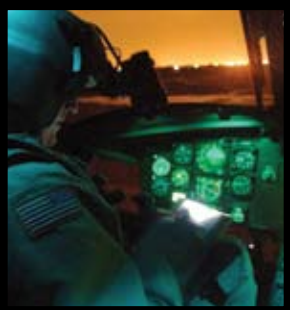
MAX Expansion Kit 4000

The MAX Express host expansion kits from One Stop Systems provides easy expansion from any host PC's PCI Express slot to a single PCI Express board or device or expansion system. The "MAX Expansion Kit 4000" pictured here consists of an upstream host interface board (HIB2), a PCI Express x4 card that plugs into the host PC's PCI Express slot, a PCIe x4 cable in lengths from ½ meter to 7 meters long, and a downstream target interface board, and a 2-slot backplane with a x16 connector on the PCIe x4 link slot. A PCIe x4, x8, or x16 card can then be operated from the second slot at the x4 speeds of 10Gb/s.

The "MAX Expansion Kit 4000" kit includes the upstream host board, cable and downstream expansion link board that plugs into the SHB slot of a PCI Express-based backplane. This allows the slots in the expansion backplane to operate at 10Gb/s as if they were located on the host. The "MAX Expansion Kit 4000" kit includes the upstream host board, cable, and a downstream, stand-alone expansion link board that can be mounted into any chassis space and provides a x16 connector for a PCI Express add-in card.







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Coming Next Month

COTS JOURNAL

Get ready to flip that calendar page over to July. Summer is kicking into gear, with more daylight hours to read *COTS Journal*. Take a look at what we are scheduling for our July issue:

- *Ethernet in the Battlespace*. Having been around for nearly 30 years and used just about everywhere, Ethernet offers just the kind of longevity and ubiquity that the military loves. Ethernet is attractive for numerous military applications such as shipboard data communications, avionics suites, mobile C3 centers and back-end data collection links for C4ISR systems. A blend of staff and contributed articles in this section updates readers on the latest embedded Ethernet solutions and system architectures.
- *Java in the Military*. To leverage the software industry's best tools and programming talent, the military is hot to migrate toward Java. Efforts are moving forward to solidify specs for real-time and safety-critical Java. This section offers a mix of staff-written and contributed articles that track the latest on Java products and specification efforts.
- *Graphics Boards in Simulation*. By leveraging cutting-edge graphics chips developed for the demanding gaming market, military graphics subsystems are now able to offer complex video and graphics functionality in highly integrated board-level solutions. Simulation and training applications rank as most demanding by users of these advanced graphics technologies. Articles in this section examine the graphics solutions available in PMC, VME, cPCI and other form-factors.
- *VME SBCs*. This year celebrating its 25th anniversary, VME has earned an enduring role as the most popular embedded computer form-factor for defense applications. Next-generation, fabric-based flavors of VME are coming together in the form of specs such as VITA 41, 42 and 46. This section updates readers on the progress of those implementations and displays a sampling of the current crop of VME SBC products.

COTS

Editorial

Jeff Child, Editor-in-Chief

Thinking decades into the future is something the U.S. Military puts a great deal of energy into—as well it should. Extensive planning for how future threats should be dealt with and how future technologies can be employed in those efforts are part and parcel of the DoD's mandate. Add to that the reality that long life cycles are the norm in military programs, and it's clear that future thinking comes with the territory.

Make Room for Discovery

That sort of planning takes on a particular significance in large, transformal programs like the Army's Future Combat Systems program, the Navy's DD(X) program, the Air Force's Transformational Satellite (TSAT) program and the Joint Tactical Radio System (JTRS) program, for example. (As it so happens, we have updates on two of those programs in this issue of *COTS Journal*.) These programs and others like them are similar in that their plans involve new technologies or technologies used in ways never tried before. That's all well and good. But concerns continue to mount as to whether those complex, future-looking projects are taking too rigorous of a pure "systems engineering" approach, and leaving out ample room for experimentation and discovery.

The schedules and roadmaps for these programs tend to jump fairly quickly into their design and development phase (quick being a relative term in the slow moving military realm). Using classic system engineering concepts, they're following the three-step strategy of developing their requirements, designing to those requirements, testing to them and then, when you've met your requirements you're done. Problem is that this approach can run afoul when you're dealing with concepts of a future capability.

Taking FCS for example, the program calls for a rich set of battle command software to run over a heterogeneous, robust, mobile wireless network. In fact, FCS depends on that network. Design and development began on FCS before there was really any certainty that such a network was feasible. It's not like designing another jetfighter. Because of the system of systems nature of FCS, you've got a very dynamic and almost unpredictable environment that the FCS systems need to play in. The restructuring of the FCS program in 2003 helped matters a lot by adding various scheduled experimentation phases—such as the field experiments Experiment 1.1 and JEFX06 that are happening this year. It will be interesting to see if those experiments are enough, or if more discovery will be needed.

For its part, the JTRS Program's troubles were less about immature technology and more to do with dealing with the radically different business model entailed in development of a software defined radio platform. Early in the life of the JTRS program a repository of waveforms was established, where anyone who needed a waveform because of a government contract could go in and get it for free. That idea didn't fly, and to date, very little is available in the repository that developers can make use of. Companies had no incentive to share their waveform Intellectual Property (IP) with one another. And why should they, when they were given no compensation for giving away their IP—and no business model in place to provide that compensation?

That's part of the reason why the JTRS program recently was pared back from 32 waveforms—many of which were key to interoperability with legacy radios—down to six: WNW, SRW, SINCGARS, EPLRS, MUOS and Link-16. Again, to me that's another example of jumping straight into the engineering without a period of discovery to seek out all the potential issues involved.

Meanwhile, the Air Force's Transformational Satellite Communications System (TSAT) attracted the skepticism of the Government Accountability Office (GAO) early in its life. One of the key enablers for the DoD's vision of Network Centric Operations, TSAT is a satellite program using laser communications intersatellite links to create a high-data-rate backbone in space. A visual image from a UAV that would take several minutes to process with existing satellites, would take less than a second with TSAT. And the Warfighter receiving it could be mobile and using a relatively small receiver, anywhere in the world.

Before it even had a chance to accumulate any cost overruns, the GAO cited that the TSAT began its formal acquisition phase in 2004 with only one of seven critical technologies mature. Coming down hard on the program, the FY 2006 defense budget gave the Pentagon only about half of the $836 million it wanted for TSAT. The Congress directed the Air Force to focus on maturing the needed technology for the program.

If there's a trend running through the hurdles and potential hurdles in all of these large, future-looking programs, it's the skipping over—or speeding too fast through—an all-important discovery phase. No one doubts the immense value these advanced programs will bring to our nation's Warfighter. It's fine to begin developing the *Concept* for an advanced military system based on immature technologies. But to begin engineering such systems based on those technologies seems to me a wasteful exercise. Perhaps a larger dose of scientific discovery mixed in with system engineering, will make a more appealing brew for the taxpayer to swallow. ▮▮

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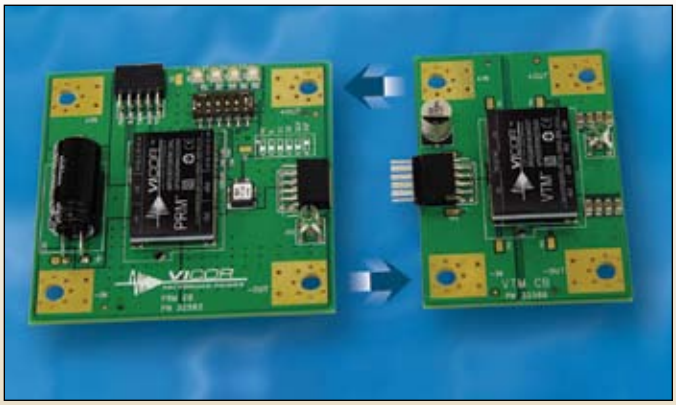

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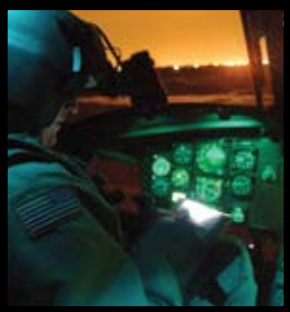

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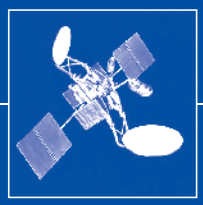

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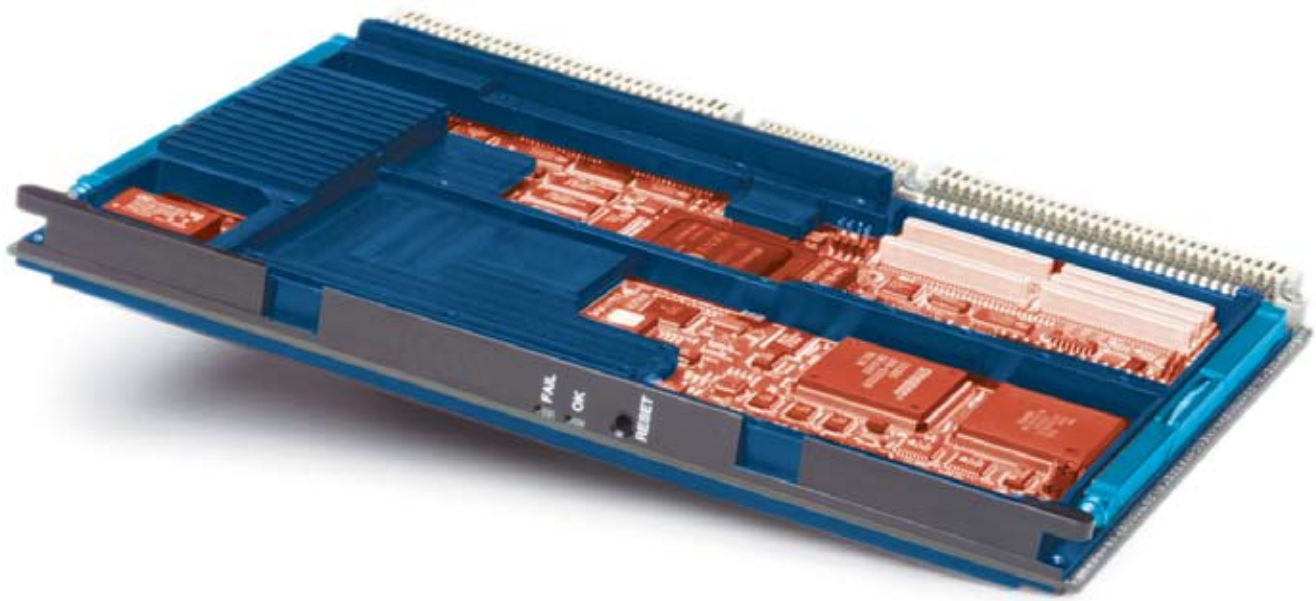

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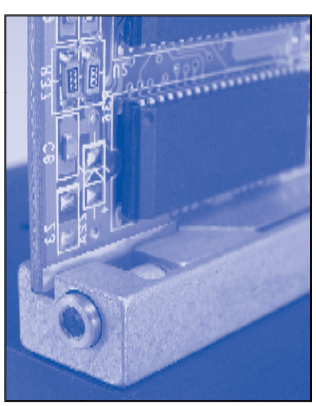

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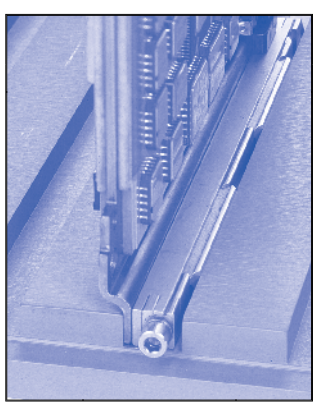

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